

DIRECT ARTERIAL SURGERY

J. H. LOUW, CH.M. (CAPE TOWN), F.R.C.S. (ENG.), *Professor of Surgery*; W. G. SCHULZE, CH.M. (CAPE TOWN), F.R.C.S. (ENG.) and L. BLUMBERG, F.R.C.S. (ENG.)

From the Department of Surgery, University of Cape Town, and Groote Schuur Hospital, Cape Town

Since the last publication on arterial surgery from this department,¹ we have had the opportunity of dealing with many more cases, and our total from January 1957 to the end of 1959 has been brought up to 180. This added experience has enabled us to assess the relative merits of the various procedures in our hands, and has helped to clarify the indications for direct procedures on the vessels. In addition one of us (J.H.L.) has had the opportunity recently of visiting vascular clinics in the USA and in England, and this has been of extremely great value to us in the handling of these patients. It is the purpose of this paper to outline briefly our present views on certain aspects of the subject and, in particular, chronic occlusive disease as it affects the lower limbs.

We have now used direct arterial surgery on aneurysms, both peripheral and abdominal, arteriovenous fistulae, and occlusive arterial disease of the lower aorta, iliac and femoral vessels, and carotid arteries. The results of direct surgery on the arteries are often dramatic, and quite out of proportion to what could be obtained by the methods previously at our disposal. Pulses which were absent reappear, rest pain disappears, and incapacitating claudication not only improves but vanishes completely. This, however, is not the rule, and not every patient suffering from arterial disease can be benefited by surgery. Many patients still have to persevere with conservative measures, a few are benefited by sympathectomy, but a considerable number are suitable subjects for direct surgical procedures of one kind or another. In any particular case, therefore, the problem always arises whether surgical measures are indicated and, if they are, which methods are most likely to give the best results, both immediate and late.

Fine judgment and careful assessment play a most important part in the management of these patients, not only pre-operatively but also at the time of the operation and in the post-operative period. Poor judgment may lead to a catastrophic result—the unnecessary loss of a limb or even of a life. Patients who require this type of surgery suffer from atherosclerosis, and all too often the symptoms from which they seek relief are merely a localized manifestation of a widespread disorder. Up to the present time it has been the policy in this school to have the direct arterial surgery performed by a limited number of surgeons until the various techniques have been completely mastered.

Aortography is today a commonplace procedure. All cases of occlusive arterial disease coming to surgery are investigated pre-operatively by means of arteriography. Both the translumbar and the percutaneous femoral route (Seldinger) are employed, depending on the particular

requirements, and up to the end of 1959 well over 200 aortograms were done in our department. Although aortography was employed originally for abdominal aneurysms, we have now discarded it because we feel that for this condition the procedure is unnecessary, does not provide accurate information and, most important of all, is liable to produce serious complications. For obliterative arterial disease affecting the lower limbs we have found aortography extremely helpful, and we have been fortunate in not having had a single serious complication following the procedure in our first 200 cases. Nevertheless, we are fully aware of the dangers of aortography, and we recommend it only in those cases where we feel useful information may be obtained in a patient who might be benefited by surgery.



Fig. 1. Extensive atheromatous disease of lower aorta and iliac arteries with complete occlusion of internal iliac. Note the gross narrowing at origin of common iliacs.

We do not make this method a routine in the investigation of all our cases of peripheral vascular disease.

A great deal has been learnt from these arteriographic studies; indeed, much of our present concept of obliterative arterial disease is based on knowledge obtained from radiographic investigations. The following are a few observations that may be of interest:

Sites of Occlusion

1. There is an extraordinary tendency for incomplete or complete occlusions in the large arteries to occur at certain situations. Thus it is common at the sites of bifurcation of the aorta and the iliac vessels, and at those sites where large vessels pass beneath ligaments, especially if these are situated at the flexures. The aortic bifurcation is a very common site for stenosis or occlusion; in fact this portion of the aorta, from the level of origin of the renal arteries down to its bifurcation, is particularly prone to the deposition of atheromatous material. In our series, the commonest site for occlusion to commence was in the superficial femoral artery at the level of the adductor hiatus.



Fig. 2. Complete occlusion of left common iliac artery and marked stenosis at origin of right common iliac. Note the extensive disease in the lower aorta.

2. Not uncommonly, one finds a remarkably localized occlusion confined to a short segment in a large artery, while the remainder of the arterial tree appears to be normal. The commonest of these situations is at the aortic bifurcation, at the bifurcation of the common iliac arteries, in the common femoral artery just beneath the inguinal ligament, and in the superficial femoral artery at the adductor hiatus.

3. Very commonly, a comparatively localized superficial femoral block is accompanied by a similar lesion in the more proximal large vessels.

4. The commonest finding of all is that there is extensive atherosclerotic disease in all the large arteries in this region and that the stenotic areas are merely localized exaggerations of the atherosclerotic process.

5. Although the aortogram provides extremely useful information, it is inadequate in two main respects:

(a) It usually does not indicate the full extent of the disease; almost invariably one finds at operation that the atherosclerotic change is more extensive than was suggested by the radiographs.

(b) Information regarding 'run-off' may be misleading. The fact that an artery is well outlined by dye on an arteriogram does not necessarily mean that the flow of blood in that vessel is normal. In fact, a slow stream of dye in a vessel is likely to give better contrast than a rapid stream. Narrowing of a large proximal vessel, no matter how limited its extent along the vessel, will slow down the distal stream where the vessels are relatively normal in calibre, and here the arteriogram may suggest that the arterial tree is normal.

Clinical Aspects

Before symptoms of vascular insufficiency in a limb become apparent, the main vessel to that limb must be narrowed down very considerably at a proximal level; it has been stated² that in general symptoms of insufficiency do not occur until the lumen above has been reduced to about 70% of normal.

In most cases intermittent claudication is the earliest symptom of obliterative atherosclerotic disease in the lower limb. This is described as a cramp-like pain, but not infrequently the patient merely complains of a feeling of tiredness or lameness in the limb. These symptoms, whether pain or a feeling of tiredness, are always quite characteristic in that they always appear only after exercise, that they begin only after a certain amount of exercise, that this amount of exercise is always constant for each patient at a given time, and that they disappear rapidly on resting. Pain in the limbs which comes on at the onset of walking, or which does not disappear within a few minutes of resting, is almost certainly not intermittent claudication. Pain which is still present after 10 minutes of resting is not intermittent claudication.

The situation of the claudication pain is usually a fairly reliable guide to the level of the arterial narrowing or obstruction. In this connection, it is important to remember that many cases of intermittent claudication do not have a complete occlusion proximally and that, because the vessel is merely narrowed, there will be palpable pulses distally. The presence of a pulse merely indicates that blood is flowing through the vessel, but it is no indication of the volume of blood passing through.

Occlusion of the superficial femoral artery gives rise to claudication in the calf. If the origin of the profunda femoris is blocked, the pain will be felt along the medial side of the thigh. When the occlusion is at a more proximal level, in the iliac vessels or in the lower aorta, the intermittent claudication extends up the thigh, and when the internal iliac arteries are occluded, there is usually severe claudication in the buttocks as well.

Narrow with, a lateral supply until the complete vessels, evidence the other and then In this acute ischaemia

An occlusion may not If these popliteal bypassing changes will be p will usually of a grade digits, it artery is procedur this incl

Local to a co sufficient they con

Narrowing of a main artery by atheroma is, to begin with, a slowly progressive process, during which time collateral vessels develop to share more and more in the arterial supply of the limb, and this process may continue insidiously until there is complete occlusion of the main artery and complete substitution of arterial supply through the collateral vessels, and yet there may be a total absence of subjective evidence when this complete occlusion finally occurs. On the other hand, narrowing often proceeds up to a point, and then superadded thrombosis completes the occlusion. In this case there are always signs and symptoms of an acute ischaemic episode.

An occlusion in the superficial femoral artery may or may not be accompanied by ischaemic changes in the leg. If these are absent or minimal, it may be assumed that the popliteal artery is patent and is being fed by collaterals bypassing the occluded segment. When the ischaemic changes are marked, it is unlikely that the popliteal artery will be patent, and in such cases the run-off at the popliteal will usually be insufficient to allow the successful attachment of a graft. In the presence of gangrene of one or more digits, it can almost certainly be accepted that the popliteal artery is completely occluded and unsuitable for a bypass procedure. The collateral circulation will have failed, and this includes the anastomosis around the knee joint.

Localized stenosis at the aortic bifurcation may proceed to a considerable degree before symptoms of vascular insufficiency become manifest and, when they do develop, they consist mainly of tiredness of the whole limb on walking.

As the condition progresses, fatigability increases to a marked degree and involves the whole leg, including the buttocks. In about 25% of these cases there is an associated impotence due to inability to maintain an erection. This constitutes the so-called Leriche syndrome.³ In this connection, it is interesting to note that not infrequently impotence may be the first presenting symptom of stenosis at the aortic bifurcation, and for this reason the patient may consult his urologist in the first place.

Stenosis or occlusion of the aortic bifurcation presents as a rule with minimal ischaemic changes in the legs, and in fact it is a characteristic finding in this condition that the legs look remarkably normal. This observation, together with the fact that the pulses at the ankle are often palpable, may fool the unwary clinician into believing that the patient's symptoms are not of vascular origin. Palpation at the groin, however, will always reveal a much reduced or even completely absent femoral pulse with a bruit on auscultation. Many of these cases have been missed in the past, and are still being missed today, and their symptoms are ascribed to a variety of different conditions. We have actually had such patients referred to us after major orthopaedic operations had failed to cure their symptoms. This means that though the dorsalis pedis or posterior tibial pulse can be felt, it does not follow that the circulation in the leg is normal.

MANAGEMENT

The Acute Occlusion

Acute intraluminal occlusion of an artery may be due either to the sudden lodgment of an embolus, or to thrombosis in a vessel previously narrowed by atherosclerosis. These are two totally different clinical entities. The clinical picture is different, the prognosis is different and, we consider, the management is different.

Embolitic occlusion of a reasonably normal artery produces a dramatic picture of severe ischaemia. This condition carries with it a grave prognosis as regards the life of the limb, and it requires urgent direct surgical measures for its successful treatment. On the other hand, thrombotic occlusion—and this is a very much commoner event—as a rule carries with it a much better prognosis. Here the resulting ischaemia is dependent to a large extent on the degree of narrowing which was present at the time of the thrombosis, and in many instances the collateral vessels will have developed sufficiently to maintain the nutrition of the limb. It has been our experience that direct arterial surgery in these thrombotic cases, even in relatively early ones, has been most disappointing. It certainly does not achieve the dramatic results that can be obtained with embolectomy.

In our opinion it is important to differentiate between these two conditions. Statements are made that disobliteration can be performed as long as several weeks after an acute occlusion, and it is quite clear that such statements must refer to embolism and not thrombosis. Thrombosis produces an acute inflammatory reaction in and around the vessel, so that direct surgery in the form of endarterectomy becomes technically an impossible feat at this stage. At a later stage, when the acute inflammatory process has subsided, disobliteration may be a feasible proposition.

Unless the patient can be operated upon within a few



Fig. 3. Complete occlusion of both common and external iliac arteries. At operation it was possible to bypass this block and re-establish the circulation to the legs.

hours of onset, we consider it wiser in most cases of thrombosis to institute conservative treatment at the outset, and our policy now is, briefly, as follows:

- (i) Raise the head of the bed.
- (ii) Begin anticoagulant treatment immediately both by the intravenous and oral routes.
- (iii) Give special care to all pressure points—the leg to rest on a thick sponge-rubber cushion.
- (iv) Avoid heat and avoid excessive cold to the limb.
- (v) Avoid vasodilator drugs, and avoid sympathetic blocks and sympathectomy. These have no place in the treatment of the acutely ischaemic limb, and may in fact do harm.
- (vi) Associated conditions such as polycythaemia, old rheumatic heart disease, myocardial infarction, and diabetes, must of course be treated appropriately.

Within a day or two it will become obvious whether the patient is going to lose his limb or not, and in fact this is often fairly obvious at the outset.

If the ischaemic changes become more severe, an above-knee amputation is done.

If the limb survives, improvement is likely to continue over the next few weeks, and possibly months. As soon as it is evident that improvement is being maintained, the patient is made ambulant. Early ambulation is an important part of the treatment, and we are quite convinced that judicious exercise is the best stimulus for the development of collateral vessels. It is important to stress that the patient must not walk so far or so fast that he develops intermittent claudication, but that he stops temporarily just short of this. We have found that Buerger's exercises are of definite value during this period. In addition the patient is put on a fat-free diet, and is asked to continue with his anticoagulant treatment for an indefinite period, providing facilities for its scientific control are available.

On this regime many patients improve quite remarkably, and if the claudication continues to improve we advise no further treatment. In cases where after a period of some months no further improvement occurs, and where the intermittent claudication remains incapacitating, or where rest pain becomes a feature, the question of operative treatment must be assessed. At this stage it may be possible to disobliterate the occluded vessel, or perhaps to bypass the occluded segment. Where neither of these procedures is possible by virtue of inadequate 'run-in' or 'run-off', a suitably planned sympathectomy may well succeed in relieving ischaemic symptoms and improving the skin circulation sufficiently to delay amputation. It is our experience that a sympathectomy performed some months after an acute occlusion is of far greater ultimate value than one done at the time of the acute episode.

Chronic Occlusions

During the period under review direct surgical procedures were used on 38 cases of occlusion in the aorto-iliac arteries, and 62 in the superficial femoral (Table I).

For a long time we have been aware of the occlusions affecting the superficial femoral artery, but it is only recently that we have fully appreciated the significance of a coincident proximal stenosis. Such an event is much commoner than was formerly recognized, and no doubt in large measure determines the success or failure of a reconstructive operation designed to relieve an occlusion in the femoral artery. All

TABLE I. DIRECT ARTERIAL SURGERY: 3 YEARS 1957-59

<i>Aneurysms</i>					
Aortic ..	..	..	..	..	26
Iliac ..	..	..	..	..	5
Peripheral ..	..	..	..	..	21
Total ..	..	..	..	..	52
<i>Arteriovenous Fistulae</i>					
	..	..	..	..	10
<i>Acute Occlusions</i>					
	..	..	..	..	10
<i>Chronic Obliterative Disease</i>					
Aorto-iliac ..	..	..	..	..	38
Femoropopliteal ..	..	..	..	..	62
Carotid ..	..	..	..	..	8
Total ..	..	..	..	..	108
Total ..	..	..	..	..	180

too frequently, the proximal involvement is only partial, and the clinical picture is completely dominated by the more distal block in the superficial femoral. In such cases any attempt at reconstruction in the thigh, whether by endarterectomy or a grafting procedure, is unlikely to succeed from the outset, unless the proximal stenosis is dealt with first.

It is an elementary rule that for any kind of reconstructive procedure to be successful, or even to have a chance of being successful, an adequate run-in above and an adequate run-off below are essential. Surgeons tend to ascribe their bypass failures to a variety of causes and, although there are many good reasons why a grafting procedure may not be successful, one of the most important ones is this basic fact concerning the run-in and run-off. In many cases of superficial femoral occlusion accompanied by a diminished flow in the proximal large vessels, we have found that disobliteration in the proximal vessels alone may improve the distal circulation very considerably, merely by providing a bigger head of pressure. In most cases, of course, this is not sufficient, and the distal occlusion is dealt with, either at the same operation or at a later stage.

DIRECT ARTERIAL SURGERY

Indications

Many of the patients referred to us are beyond the scope of surgery. It is our experience that once there is gangrene of a digit, or infection of any kind in the distal part of the limb, direct arterial surgery is unlikely to succeed. This applies especially to grafting procedures. Sepsis and grafting materials are quite incompatible. Severe ischaemia in the foot, especially when there is marked rubor which does not fade on elevation of the limb, or actual gangrene of a digit, usually denotes a poor run-off at the popliteal artery and, in fact, thrombosis in the distal arterioles as well. These are usually unsuitable cases for direct surgery on the larger vessels. Attempts to endarterectomize the partially occluded popliteal artery in such cases always fail to produce a better run-off or back-flow.

In the main we have tended to reserve the reconstructive operations for patients presenting with severe claudication and those presenting with early ischaemic changes, and this applies in particular to the superficial femoral occlu-

sions,
time h
the pic
endarter
are of
an ear
impro
arterie
advised
Endarte
which
and, a
patenc
has pr
especia
arterec
be imp
resorte

Femor
The
superfi
hiatus
be loca
or lat
degree
occlus
in the
situate
Earl
terecto
the in
them.
another
arterie
proced
out (T
4 case
patent
about
artery
to obt
used
were n
woven

TABLE

sions, where the standard procedure up to the present time has been a bypass graft. In the proximal large vessels the picture is rather different. Here it is often possible to endarterectomize a localized segment of artery, and we are of the opinion that in such cases it should be done at an early stage, even if claudication is not severe. With improvement in technique of endarterectomy of the smaller arteries, we consider that this operation should now be advised at a much earlier stage than was our former practice. Endarterectomy of a short segment of artery is a procedure which is usually followed by excellent return of circulation and, according to reports available so far, the long-term patency is extremely good. Once the obliterative process has progressed to involve a long segment of artery, and especially if this is the superficial femoral, not only is endarterectomy a more difficult procedure, but it may well be impossible, so that a grafting procedure then has to be resorted to.

METHODS

Femoropopliteal Block

The common site for commencement of occlusion in the superficial femoral artery is at the level of the adductor hiatus in the lower third of the thigh. The occlusion may be localized to a very short segment at first, and then sooner or later extends upwards and downwards to a varying degree. Commonly the arteriogram will show a similar occlusion, or else a narrowed segment not yet occluded, in the superficial femoral artery of the other limb, and situated at exactly the same level.

Early in our series 5 patients were subjected to endarterectomy, but these were all uniformly unsuccessful because the involved segment of artery was too extensive in all of them. A bypass graft was then substituted in these. In another 10 cases, exploration of the femoral and popliteal arteries showed these vessels to be unsuitable for a direct procedure. In the 47 cases, a bypass procedure was carried out (Table II). Arterial homografts were used in the first 4 cases (early in 1957) and, of these 4, the arteries are still patent in 2, in 1 the patient died of coronary thrombosis about a year after the graft operation, and in the 4th the artery became occluded. Mainly because it was difficult to obtain suitable homografts, the synthetic materials were used early on, and the prostheses used at various stages were nylon, dacron, knitted teflon and, in the last 19 cases, woven teflon.

TABLE II. PROCEDURES FOR CHRONIC OBLITERATIVE DISEASE

<i>Thrombendarterectomy</i>					
Aorto-iliac	..	..	..	..	33
Femoropopliteal	..	..	..	..	5
Carotid	..	..	..	..	7
Total	..	..	..	..	45
<i>Grafts</i>					
Aorto-iliac	..	..	..	..	4
Femoropopliteal	..	..	..	..	47
Total	..	..	..	..	51
<i>Exploration only</i>					
Aorto-iliac	..	..	..	..	1
Femoropopliteal	..	..	..	..	10
Carotid	..	..	..	..	1
Total	..	..	..	..	12

It is our experience, in common with that of most other workers in this field, that, of all the artificial materials so far devised, woven teflon grafts have given the best results in bypass procedures in the leg.

According to the many reports which are now appearing in the literature,^{2,4-6} it would appear that, of all the grafting materials, the autogenous vein graft is superior to any other, and is more likely to give a long-term patency than any other. Unfortunately it is not always possible to obtain a suitable length of vein to provide an adequate reconstruction in every patient who may need one.

The arterial homograft, which looked promising at first has now been found wanting in several respects and is considered to be the least satisfactory of all the prostheses used so far. It is particularly liable to early degeneration, to calcification, and to aneurysmal dilatation.^{7,8} In addition the long-term patency is disappointing.

Of the artificial grafts, a very considerable proportion, varying from about 10% to as many as 50% according to different authors, can be expected to thrombose in 6 months.⁹⁻¹⁰ The Mayo Clinic in a very recent report,⁷ has claimed a high percentage of patency after 6 months.

Reports of large series are now beginning to appear in the literature, but at the present time it is still impossible to say what the 5-year patency rate is likely to be. It is true that the long-term patency of artificial grafts is steadily improving, and there are numbers of reports where a considerable percentage of these are functioning after a period of 6 years and more.⁵⁻⁸

In our own series of graft operations for femoropopliteal block, although still very early, we have had 4 post-operative deaths and 10 early failures, and there have been 2 late closures (Table III).

TABLE III. RESULTS IN CHRONIC OBLITERATIVE DISEASE

Site	Procedure	Number	Deaths	Early Failures	Late Closures
Aorto-iliac	Graft	—	—	—	—
	Endarterectomy	33	—	4	—
Femoropopliteal	Graft	47	4	10	2
	Endarterectomy	5	—	3	—
Total		89	5	17	2

We are of the opinion now, that for a short occlusion in the superficial femoral artery, endarterectomy should be attempted. Where the occluded segment is extensive, and particularly when associated with calcification in the vessel, a bypass procedure is the treatment of choice. Where possible, the graft should be an autogenous vein and, when this is not available, woven teflon should be used.

Aorto-iliac Occlusion

Here the position is different, and we have been very impressed by the excellent results following thrombendarterectomy in many of our cases, and especially in those where a localized segment of common iliac or lower aorta was involved.

Where the lower aorta, common iliac and external iliac arteries are extensively involved, and especially when these vessels have become tortuous, narrowed and calcified, we are faced by a more difficult problem. Often in these cases there is also extensive disease in the superficial femoral and common femoral arteries, so that direct surgery becomes a heroic and unrewarding procedure. However, if it can

be shown that the common femoral artery is patent and is capable of a reasonable back-flow, then there are alternative methods available for restoration of the blood flow. Whenever possible, thrombendarterectomy is the procedure of choice, and it is the one most likely to give a good long-term result. It is estimated that this procedure is possible in only about 75% of cases where it would have been possible to bypass the obstruction by means of a graft.⁴

In this situation, the grafts are on the whole more successful than they are in the thigh, although the same disappointing results are obtained from homografts. It may be possible to excise a segment of artery and replace it by means of synthetic material but, in general, the method of choice is to attach the graft, either to the aorta or to the common iliac artery above, and then to the common femoral below. In some cases, where there is extensive disease in the superficial femoral artery in addition, the graft may be brought right down and attached to the popliteal artery.

Where the common iliac and external iliac arteries are extensively involved and not suitable for endarterectomy, we prefer to transect the common iliac near the aorta, endarterectomize the proximal portion into the aorta, and then attach the graft end-to-end to the divided end of the common iliac. We have found that this is more likely to succeed than an end-to-side anastomosis. At the lower end an end-to-side anastomosis is made with the common femoral. If it is decided to take the graft down to the popliteal artery, then an end-to-side anastomosis is made at the lower end as well but, in addition, a side-to-side anastomosis is made between the graft and the common femoral artery opposite the origin of the profunda femoris.

In our 38 aorto-iliac cases, there were 4 grafting procedures, with 1 death and no late closures; and 33 endarterectomies, amongst which there were 4 early failures and, up to date, no late closures.

Anticoagulants

It has been our policy to have the patient well heparinized during the course of the operation, and then deheparinized at the end of it. Usually on about the 2nd or 3rd post-operative day, oral anticoagulant therapy is commenced and this is continued indefinitely, the prothrombin level being controlled at regular intervals.

Sympathectomy and Conservative Treatment

A considerable number of patients seen at our clinic are not suitable for direct arterial surgery. In many the disease has progressed beyond the reasonable scope of direct surgery, while in others it has shown its effects in other regions of the body. Many cases give a history of a previous coronary thrombosis, but this does not necessarily preclude them from surgery. It is estimated that at least 75% of patients with symptoms of arterial insufficiency in their legs show clinical evidence of atherosclerotic heart disease. About 20% will have had a cerebrovascular accident, about 50% suffer from hypertension, and in addition there will be a considerable number who have serious renal impairment. Probably not more than about 12% of the patients can be expected to have no other clinical evidence of atherosclerotic disease.¹¹

Conservative measures must therefore play an important part in the management of many cases, and many patients can be improved very considerably along such lines. Amongst

these measures, regular exercise is an important—indeed, an essential—part of the treatment. In our opinion, the vasodilator drugs have no place in the treatment of these cases; in fact they can do harm. We have used vitamin E quite extensively in large doses for a considerable period, but we are not impressed by its value. We find, on the other hand, that the anticoagulants have a definite place in the treatment of these cases, especially if they can be given over a prolonged period, and of course provided that the prothrombin level can be checked regularly.

In a few cases, sympathectomy still has a place in the treatment, not for the purpose of relieving intermittent claudication, but with a view to delaying the onset of ischaemic changes in the distal extremity. Where there is extensive occlusion of the aorto-iliac vessels in addition, we have found that the standard lumbar sympathectomy is inadequate, and in these cases we perform an extended sympathectomy, resecting the whole of the lumbar chain together with the lower 4 dorsal ganglia.

Abdominal Aortic Aneurysms

In the period under review, resections of aortic aneurysms with replacement by synthetic prostheses have increased to 26 cases. Another 26 cases of peripheral aneurysms have also been dealt with, in 2 of which—1 popliteal and 1 carotid—the defect was replaced by means of a vein graft.

Our indications for operation in abdominal aneurysms remains unchanged. Provided there are no other contraindications to surgery, we consider that operation is indicated in every case presenting with symptoms from the aneurysm, including subjective awareness of pulsation in the abdomen. Needless to say, rupture or leaking of the aneurysm constitute an emergency. For the patient with an aneurysm of small size with no subjective symptoms, and who is able to report for regular routine checks, we continue to err on the conservative side.

Synthetic prostheses have been used in all our cases, woven teflon being the material in use since September 1958. Aortic homografts are generally considered to be inferior to the synthetic materials, being liable, as in the more distal vessels, to aneurysmal dilatation and early degenerative changes.^{2,7}

Extracranial Cerebral Vascular Disease

Whereas, in the past, vasospasm was considered a possible cause of cerebral ischaemia, it is now well established that in many of these cases the ischaemia is due to disease of the carotid and vertebral arteries, in the extracranial part of their course. In the majority of cases, the narrowing is due to atherosclerosis, and it is stated that occlusion of this part of the carotid artery occurs as commonly as occlusion of the middle cerebral, and that occlusion of the vertebral artery in its cervical course occurs more frequently than occlusion of either the basilar or posterior inferior cerebellar artery.

An interesting observation is that in the case of the carotid, the atheromatous disease is frequently localized in the internal carotid artery at a point 1 cm. above its origin, while in the vertebral artery the lesion is confined to the portion lying between its origin from the subclavian and the vertebral canal.

It is not infrequent for haemorrhage to occur in the base of such a plaque and thus produce an acute episode of ischaemia.¹²

Between a third and a half of patients coming to autopsy with cerebral infarction show advanced disease of the carotid and vertebral arteries in varying combinations. Commonly all 4 vessels are involved in stenosis or occlusion. Less commonly only the carotids are affected, and least commonly only the vertebrals.¹³

Much attention has in recent years been given to the syndrome of 'little strokes' defined by Alvarez,¹⁴ in which transient episodes of neurological disturbance are often a prelude to a major cerebral catastrophe. Between these attacks the patient may be completely symptom-free or alternatively his attacks are superimposed on a state of gradually deteriorating neurological dysfunction. It is in this group of patients that at autopsy atheromatous stenosis is commonly found in the extracerebral vessels, and it is suggested that the transient attacks of ischaemia are caused by temporary failures of the collateral circulation, which in these cases must depend on the vertebral arteries and the carotid on the other side. It is clear that a degree of stenosis may be present for some time without producing symptoms of any kind, and that any illness producing a sudden hypotension may then precipitate an attack of cerebral ischaemia.

Surgical treatment for this condition has now become well established, and the results where the occlusion is incomplete are very good. Where it is complete the results are unsatisfactory, although Rob¹² feels that there is a place for disobliteration in an early case of complete occlusion before the thrombus has had time to become adherent to the vessel wall. It is important in all these cases where direct surgery is contemplated to have all 4 arteries outlined by arteriography before a decision is made regarding ultimate treatment. It is felt that there is a very definite place for direct arterial surgery in the early case of stenosis of the carotid artery, even more so than there is in the case of the lower limbs.

SUMMARY

We are greatly impressed by the results of direct surgical procedures in the treatment of occlusive vascular disease affecting the lower limbs and the carotid arteries.

Whereas in the early stages of our series, it was mainly the well-advanced case of atherosclerosis that was considered for grafting or endarterectomy, we now take the view that there is a very definite place for this type of surgery in the early case.

Extremely good results can be expected in all patients presenting with a limited area of stenosis or occlusion, and this applies both to the carotid arteries and the large arteries supplying the lower limbs.

Once extensive disease has occluded the greater part of the aorto-iliac vessels, endarterectomy may still produce an excellent result, and this is always preferable to a grafting procedure.

Most of our femoral occlusions have been late cases,

in which endarterectomy is impossible, and a bypass graft has had to be inserted. Here the results, although quite dramatic in some cases, are on the whole not as good. Nevertheless, many of the patients are extremely pleased with the result; their claudication has either disappeared altogether or else it has been greatly improved. In a considerable proportion, of course, the grafting procedure has been a limb-saving operation.

All writers have experienced late closure in the grafts in a certain percentage of cases, no matter what the material employed, but this complication does not necessarily compromise the circulation to the limb, and in fact in many of these cases good results have followed a second and even a third grafting operation.

Because of the better long-term results following endarterectomy, we feel that this operation should be employed more frequently in the thigh but, in order for this to be possible, the patients must be seen at an earlier stage of their disease.

There is still a very definite place for sympathectomy in certain cases but, where the occlusion is at a high level, the sympathectomy must include at least the lower 3 or 4 dorsal ganglia.

A large percentage of patients must still be content with conservative measures, and there is no doubt that many are benefited very considerably by a carefully planned regime.

Direct arterial surgery is difficult surgery. Very careful assessment is required in every case, because not only are the various procedures liable to special complications, but most patients coming to surgery suffer in addition from other manifestations of their atherosclerotic disease.

We wish to thank all our colleagues who have referred cases to us, and also to express our gratitude to Dr. J. G. Burger, Medical Superintendent, Groote Schuur Hospital, Cape Town, for permission to publish the data concerning this series. We are grateful to Mr. G. McManus for the photographs.

ADDENDUM

It is interesting to note that whereas during the 3-year period under review 45 cases of endarterectomy were performed, we have added another 43 during the first 5 months of this year. The 88 endarterectomy cases are split up as follows: Aorto-iliac 61, femoropopliteal 12, carotid 14, and renal 1.

REFERENCES

1. Louw, J. H. and Blumberg, L. (1959): *S. Afr. Med. J.*, 33, 576.
2. Linton, R. R. (1959): *New Engl. J. Med.*, 260, 272.
3. Leriche, R. (1940): *Presse méd.*, 48, 661.
4. Warren, R. and Villavicencio, J. I. (1959): *New Engl. J. Med.*, 260, 255.
5. Crawford, E. S., deBakey, M. E., Morris, C. and Garret, E. (1960): *Surgery*, 47, 102.
6. Whitman, E. J., Jones, J. M., Ivins, J. C. and Johnson, E. W. (1960): *Ibid.*, 47, 45.
7. Kanar, E. A., Nyhus, N. M., Moore, H. G., Zeck, R. K. and Harkins, H. N. (1956): *Ann. Surg.*, 143, 397.
8. Rob, C. (1960): *Proc. Roy. Soc. Med.*, 53, 38.
9. Crawford, E. S. *et al.* (1960): *Surgery*, 47, 79.
10. Key, J. A., Bigelow, W. G. and Farber, E. P. (1960): *Ibid.*, 47, 74.
11. Beckwith, R., Hoffman, E., Eismann, B. and Blount, S. G. (1958): *New Engl. J. Med.*, 258, 721.
12. Rob, C. (1959): *Proc. Roy. Soc. Med.*, 52, 540.
13. Hutchinson, E. C. and Yates, P. O. (1960): *Postgrad. Med. J.*, 36, 14.
14. Alvarez, W. C. (1955): *J. Amer. Med. Assoc.*, 157, 1199.

BOEKE ONTVANG : BOOKS RECEIVED

Proceedings of the World Congress of Gastroenterology and the 59th Annual Meeting of the American Gastroenterological Association, Washington, D.C., USA, 25-31 May 1958. Vols. 1 and 2. Pp. xxv+1363. Illustrated. 160s. London: Baillière, Tindall and Cox Ltd. 1959.

Pädiatrischer EKG-Atlas. Von Priv.-Doz. Dr. W. Heck und Dr. J. Stoermer. Pp. xvi+230. 181 Abbildungen in 228 Einzeldarstellungen und eine Messtafel zur Bestimmung des Vektors und zur Ausmessung der Herzfrequenz. Ganzleinen DM 78.00. Stuttgart: Georg Thieme Verlag. 1959.

Ons leef tans in 'n tyd waarin feitlik elke biologiese werker homself as 'n fisioloog beskou. Byna alle gedagtes oor lewende prosesse en weefsels word vandag gekenmerk deur 'n benadering uit 'n funksionele oogpunt—dus 'n fisiologiese benadering.

Dis moeilik om te sê wanneer die fisiologie gebore is. Harvey se sirkulasie- en kardiaal-studies, en Stephen Hales se bloeddrukbevestigings en berekenings van kardiaal uitwerping in die sewentiende en agtiende eeue was vroeë bydraes,¹ maar Aristoteles (384 v.C.) en Galen in die tweede eeu n.C. het reeds al bydraes gelewer wat miskien vandag se begrip van 'balans' en 'wanbalans', kortom homeostase, nie onbekend laat voorkom nie.

Die ontwikkeling van 'n wetenskap berus op: (1) Die daarstelling en uitbreiding van metodiek, instrumentasie, vaardigheid, en tegniek; (2) die versameling van feite en die ontwikkeling van nuwe velde en, vanweë gevolglike organisasie, die onderverdeling van gedagterigtings in meer gespesialiseerde onderafdelings; (3) hieruit word nuwe konsepte of groot idees gebore wat groei, ryp word en die ouer insigte verbreed.² Op die manier word chaos in orde omskep en die sintese van praktiese gebruike vir sulke konsepte volg feitlik outomaties. Hierdie drie prosesse volg nie noodwendig op mekaar nie, maar kan tegelyk of in omgekeerde volgorde geskied.

Ons sou kon sê dat die fisiologie tot die begin van hierdie eeu soos 'n onbekende see gekaart en ondersoek moes word, en ons kan volstaan met name soos Helmholtz, Mayer, en Joule wat die behoud van energie begryp het. Eersgenoemde is dan ook veral bekend vir sy studies oor die spoed van senugeleiding en sy teorie van kleurvisie. Ludwig het die kimograaf en die kwikmanometer daargestel voor sy dood in 1895. Claude Bernard het die begrip van homeostase en die milieu interieur daargestel benewens reusagtige bydraes tot 'n wetenskap wat op hierdie stadium genoeg feite versamel het, maar gewag het vir 'n saamvattende sintese van feite tot denkrigtings. Beaumont in Amerika, met sy waarnemings oor spysvertering in Alexis St. Martin se maag, is welbekend. Sedert daardie tyd (1833) tot 1861, toe Austin Flint professor in die fisiologie aan die Bellevue Hospitaal geword het, was fisiologiese werk in die V.S.A. relatief steriel. Sedert 1861 was daar 'n fenomenale groei en, miskien te danke aan Vaughan se laboratorium, het fisiologiese chemie, of biochemie, veral in daardie land vinnig tot wasdom gegroei.

Hierdie basiese feiteversameling lui dan die periode van organisasie en spesialisasie in, nl. die periode van 1900 tot tans. Fisiologiese chemie, endokrinologie, biofisika, elektrokardiografie, elektro-ensefalografie en die studie van mikroskopiese fisiologie groei soos spruite uit die grondliggende fisiologie om selfstandige vertakkinge te word, elk met sy eie tydskrifte, kongresse, en vaktiaal.

Chandler Brooks,² in 'n onlangse simposium, beskou die volgende as die belangrikste temas in die fisiologiese denke oor die afgelope vyftig jaar:

1. *Die studie van energie-metabolisme.* Hierdie studie

vloei uit die meganiese beskouing van die mens as masjien—'n denkwysse bekend as cybernetika,³ en uit die konsep van 'die wet van die behoud van energie.' Hier hoef ons net Atwater, Rosa, en Benedict se name te noem om aan kaloriemetrie te dink, en Lusk en Du Bois se name om aan liggaamsoppervlakte te dink. Basale metabolisme, werkverrigting, en biochemiese en biofisiese prosesse van energie-produksie is vandag die gebied van die biochemikus, die -fisikus, die kardioloog en die endokrinoloog. Uit hierdie metaboliëse studie ontstaan ook die studie van voeding.

2. *Die fisiologie van vertering.* Sedert Beaumont kom die werkers soos Bayliss en Starling, Cannon, en Pavlov na vore. Hulle toon die meganiese werking van die ingewande aan, en ook sekretie en ander ingewandshormone, die kliere van die spysverteringskanaal, en die absorpsie van voedingstowwe.

3. *Die integrasie van die sentrale senuustelsel.* Die vroeë waarnemings bied 'n agtergrond vir Sherrington se reusagtige werk oor refleksie en die beginsel van 'n 'gemene pad'. Die integrerende werking en die spinale refleksie is in klassieke werke bespreek. J. C. Eccles en John Fulton het hierdie werk verder voortgesit en uitgebrei. Studies oor kortikale verteenwoordiging vloei uit Cushing se vroeë werk voort en die studies van die gekondisioneerde refleksie van Pavlov is bakens in hierdie veld.

4. *Die ontdekking van die humerale oordraging van die senuweeimpuls.* Hierdie ontdekking het aanleiding gegee tot die studie van asetielholien en adrenalin en noradrenalin impuls-oordraers. Dit lui ook die begrip van cholinergiese en adrenergiese senuwees in, en die studie behels tans die werking van serotonien, aminosure, histamien, ens., as sentrale sinaps-oordraers. Hierdie veld is oopgestel deur die drie werkers Cannon, Dale, en Loewi vanaf 1921.

5. *Die ontwikkeling van die endokrinologie.* Behalwe vir die waarnemings in vroeë tye kan mens sê dat die eerste hormoon, sekretie, deur Bayliss en Starling in 1902 ontdek is. Die verhare van insulien, adrenalin, die biniërs-kors-hormone, tiroïed-funksie, ens., is so nuut dat hulle nog vars in ons denke is. Die hipotalamiese-hipofisiese verwantskap wat die neurologie en die endokrinologie verbind, is vandag prominent in ons denke.

6. *Homeostase.* As gevolg van Claude Bernard se werk en die milieu interieur het die begrip van homeostase van elektroliete en van suurbasis, en Selye se begrip van 'stress' ontstaan. Die alarmreaksie, aanpassing, en uitputting is vandag bekende begrippe.

Die studie van die hematologie, van anemie en bloedstolling, en van vitamien en ensieme is vandag nouer verbonde aan die biochemie en word net genoem.

As mens dink aan die gevolg van Einthoven se stringgalvanometer en die elektrokardiogram, Landis se studie oor vog-bewegings in die enkele kapillêre vat, Richards se mikropuntuur van die glomerulus van die nier, studies oor die mioneurale aansluiting, en die beweging van Na⁺ en K⁺ oor die selmembraan, besef mens hoedat die fisiologie sy

wortels skiet in die chemie, die fisika, die anatomie, en die wiskunde om sy vrug te dra in die takke van die interne geneeskunde, die chirurgie en verwante kliniese vakke. Die kliniese navorsing van vandag is die gevolg van die basiese en akademiese navorsing van gister.⁴

1. Fulton, J. F. (1930): *Selected Reading in the History of Physiology*. Springfield, Ill.: Charles C. Thomas.
2. Brooks, C. McC. (1959): *Bull. Hist. Med.*, 33, 249.
3. Wiener, N. (1948): *Cybernetics*. London: John Wiley & Sons.
4. Crane, P. F. (1959): *Bull. Hist. Med.*, 33, 263.

THE TREATMENT OF ACCIDENTS IN SOUTH AFRICA

One of the effects of the advancement of surgery and of the progress made in the super-specialties of this discipline is that the position of the central figure, the general surgeon, has become more and more precarious. From being little short of monarch of all he surveyed a mere thirty years ago, he finds himself today 'cribbed, cabined and confined', his field encroached upon by many advancing specialists, and his future uncertain. He is becoming a rare creature, apparently heading for early extinction.

But in one field at least the position of the general surgeon is still secure: The increasing speed of modern travel makes traumatic surgery an ever more important subject. Since Lorenz Böhler established the Unfallkrankenhaus in Vienna in 1926, the importance of concentrating the treatment of injuries into special centres has proved its value both from the medical as well as from the economic point of view.

Since that time continually increasing speed of travel and several wars, major and minor, have confirmed the truth of this principle, and in Britain the Birmingham Accident Hospital, which was founded in 1941, today deals with more than 50,000 new patients every year. While the paramount need for suitable accommodation and treatment of acute accidents has never been questioned, opinions differ on the question whether a special accident hospital will provide better treatment to a case of acute injury than a well-organized accident service embodied as one of the facilities of a big general hospital. It is only in a general hospital that the specialized ancillary skills such as orthopaedic surgery, neurosurgery, maxillo-facial surgery, thoracic surgery and ophthalmology (to name but a few) can be found readily available. The accident hospital on its own would require to call on 'super-specialists' in these fields from other institutions because, unless this hospital happens to

be situated in the heart of a metropolis, it is doubtful whether enough work would be found to keep these experts occupied on a twenty-four hour basis. Undoubtedly, admitting patients to the nearest hospital immediately after an accident, has its advantages, but while life is often saved, the ultimate result is sometimes poor. Perhaps the answer lies in a compromise solution—admitting patients with acute injuries to a resuscitation centre and transferring them as soon as it is safe to designated places where the best expert accident services are available.

In South Africa, a land of vast distances, the problem is mainly one of logistics—how to make the injured man fit to travel and how to bring him betimes to suitable treatment centres. The distances in the country are so great and the numbers of trained personnel so small, that it appears that it would pay to devote our energies to organizing full accident services within the framework of existing teaching hospitals only. While good work is undoubtedly being done in the smaller non-teaching hospitals, the availability of these highly trained personnel in teaching hospitals only, makes this choice almost one of necessity.

Once this course is accepted, and it cannot be an easy decision to make, we should move swiftly. The government and the profession should combine to integrate proper transport facilities—if necessary using helicopters and light aircraft—with these designated accident centres. A full scheme should be put forward and implemented soon at the highest levels.

Of course the project is an expensive one; but it is necessary to put the matter into its proper perspective—'The cost per incident is not the basis of the fire-brigade or lifeboat services'.¹

1. Clarke, R., Badger, F. G. and Sevi, S. (1959): *Modern Trends in Accident Surgery and Medicine*. London: Butterworth.

MEDIASTINAL HYDATID CYSTS

R. P. HEWITSON, F.R.C.S. and R. D. CASSERLEY, CH.M., *Thoracic Surgical Unit, Groote Schuur Hospital, Cape Town*

There are few reports of hydatid cysts of the mediastinum in recent medical literature in English, for in most countries the disease is uncommon. A record of 7 patients with such hydatids in our local experience may therefore be of interest.

Of the 52 mediastinal tumours treated surgically during the past 7 years in the thoracic surgical unit at Groote Schuur Hospital, 7 were due to extrapleural echinococcal cysts—as high a proportion as 13.5%. This number is about 6% of all patients with hydatid disease treated at the hospital during this period, whereas pulmonary cysts formed about 30%.

There are numerous articles on mediastinal tumours with no mention of hydatid cysts amongst the conditions seen.

This is true especially for North America but also, for example, for a Scandinavian series of 155 tumours.¹ In the large monograph by Heuer and Andrus published in 1940,² 1 case is mentioned which presented as a swelling above the right breast and which was drained externally. Passing mention is also made of 7 cases of hour-glass cysts presenting as spinal tumours, but no clear references are given.

In 1952, in a report from Australia on 26 mediastinal tumours,³ 1 was a presumptive hydatid; the patient had a hydatid cyst of the liver but refused thoracotomy for a round mediastinal shadow.

Recent literature in Spanish (South American), Russian and Italian contains reports of hydatid cysts of the media-

stinum, pericardium, and heart. In 1954 a good outline of cardiac hydatids¹ with a report of a case was published in Britain, but in our experience we have not encountered one, though they have been variously reported as from 0.5% to 2% of all hydatid cysts. The 7 cases presented below comprise 5 single hydatids, one case with 2 cysts, and a case with 5 mediastinal cysts and 1 pericardial cyst.

CASE REPORTS

Case 1. H.F.—White male aged 27 years

A mass was noted at the left apex on mass X-ray examination.

He admitted to having had occasional pains in the left chest but this was not a prominent symptom. The mass was ovoid, about 7 cm. across, and medially entered the mediastinum at about the 3rd and 4th ribs. The pre-operative diagnosis was neurofibroma.

At thoracotomy an extrapleural hydatid cyst was found. Unfortunately the cyst ruptured during removal; some formalin was used in the sac and the rest was sucked out. A 6-year follow-up has shown no recurrence.

Case 2. G.B.—Coloured male aged 32

He presented a picture almost identical to the previous case, except that the cyst was slightly smaller. It was removed without rupture.

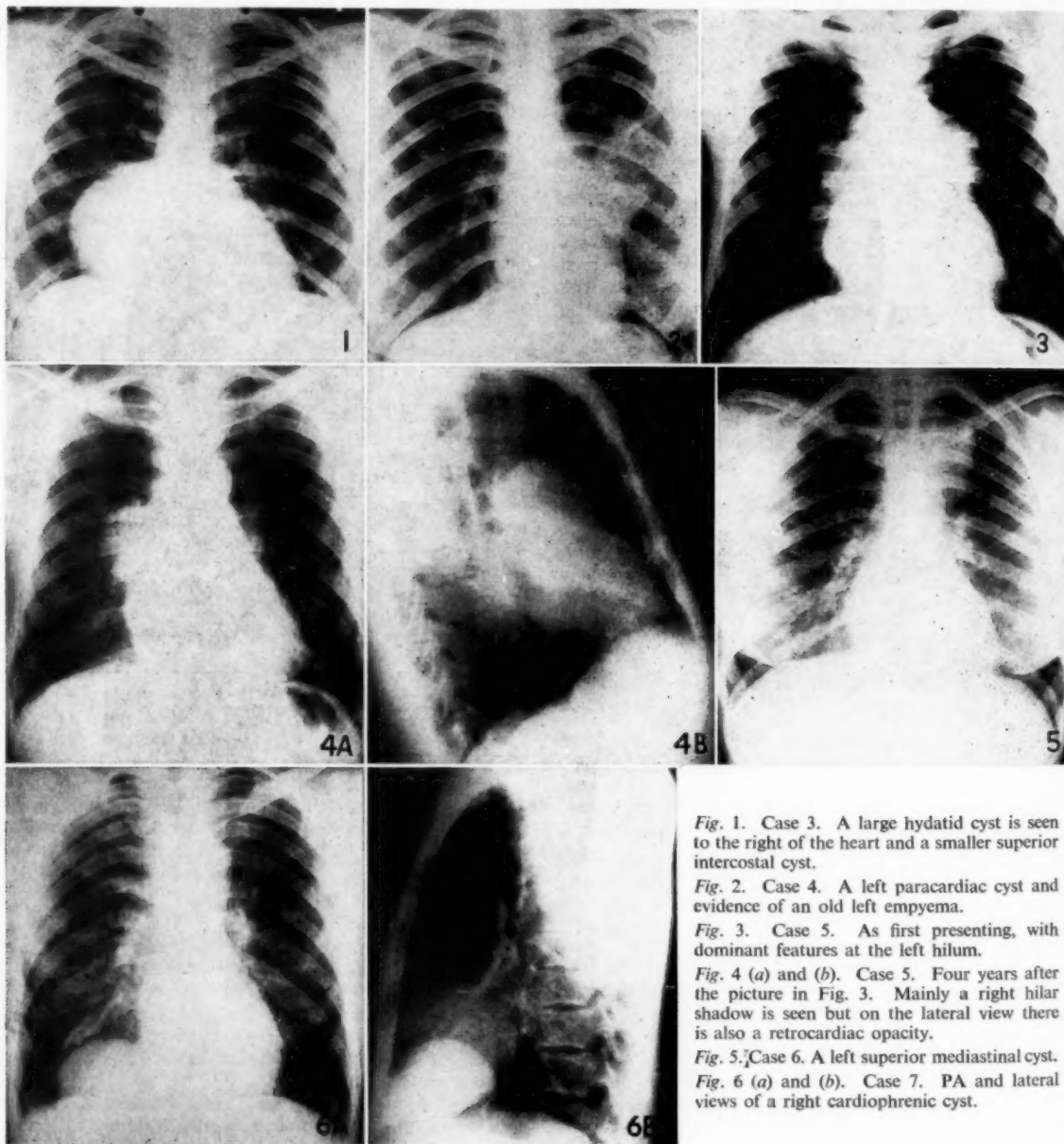


Fig. 1. Case 3. A large hydatid cyst is seen to the right of the heart and a smaller superior intercostal cyst.

Fig. 2. Case 4. A left paracardiac cyst and evidence of an old left empyema.

Fig. 3. Case 5. As first presenting, with dominant features at the left hilum.

Fig. 4 (a) and (b). Case 5. Four years after the picture in Fig. 3. Mainly a right hilar shadow is seen but on the lateral view there is also a retrocardiac opacity.

Fig. 5. Case 6. A left superior mediastinal cyst.

Fig. 6 (a) and (b). Case 7. PA and lateral views of a right cardiophrenic cyst.

Larg
the ch
opacity
about
heart
apex of
diagnos
lying u
and the
space.

When
the left
it appe
had dr
and ap
She t
was th
scarring
thoraci

When
seen pr
and ab
lie in th
thorac
empyem
mediast

Mass
It was
pulmon
in the
glands
elsewh
was per
just an

Furt
at the
second
period
it had
visible
the ph
superio
in toto
The pe
opened
superio
obliter
outside
vein.
infected
presum
normal

Agai
mediast
to case
was so
space.
end of
rupture

Rout
be har
cardiop
cyst wa
diaphra
remove

The ro
explain
route
liver a

Case 3. S.V.R.—White female aged 28

Largely asymptomatic, she admitted to a feeling of heaviness in the chest, and on radiological examination 2 well-defined round opacities were visible in the right chest (Fig. 1). The larger was about 7 cm. in diameter and lay against the right border of the heart; the other was about 3 cm. across and projected from the apex of the thoracic space. Hydatid cysts were suspected, and this diagnosis was confirmed at thoracotomy. The larger cyst was lying under the mediastinal pleura adjacent to the pericardium and the smaller was situated extrapleurally in the second intercostal space. Both were removed without difficulty.

Case 4. P.F.—White female aged 22

When about 3 years old this patient had had an empyema of the left chest drained, and when we obtained the doctor's report it appeared that this had been caused by a hydatid, for 'grape skins' had drained with the pus. This empyema healed satisfactorily and apparently left her with no disability.

She trained as a nurse and, though a small mediastinal swelling was then noted on X-ray, the radiologist associated this with scarring from the old empyema and she was not referred to a thoracic surgeon until after finishing her training.

When seen, she was asymptomatic, but a cystic swelling was seen projecting from the left hilar region on the P.A. film, ovoid and about 6 cm. across (Fig. 2). The lateral view showed this to lie in the anterior mediastinum, and a dermoid was suspected. At thoracotomy, there was some scarring and adhesion from the old empyema, and a live hydatid was removed from the anterior mediastinum without rupture.

Case 5. J.M.—Bantu male aged 29

Mass X-ray revealed an asymptomatic lesion at the left hilum. It was lobulated but well-defined and lay just anterior to the pulmonary structures (Fig. 3). There was possibly a small increase in the size of the right hilum also and disease of the lymphatic glands was suspected. There were no other glands or findings elsewhere to aid in the diagnosis, and so diagnostic thoracotomy was performed. Two hydatid cysts were found in the mediastinum just anterior to the hilum, and these were successfully removed.

Further radiological check (Fig. 4, *a* and *b*) showed the lesion at the right hilum to increase in size and about 4 years later a second thoracotomy on the right was performed. During this period the cyst had grown to about 6 cm. in diameter; presumably it had been perhaps 2 cm. when first seen. At thoracotomy the cyst visible on the X-ray film was found to be a live hydatid displacing the phrenic nerve laterally and coming out from between the superior vena cava and the right pulmonary artery; it was evacuated *in toto* from within the ectocyst, which was adherent to the vessels. The pericardium was adherent and slightly thickened; after it was opened an inspissated hydatid cyst was found in relation to the superior pulmonary vein within the pericardial cavity, which was obliterated. Finally 2 more inspissated cysts were found just outside the pericardium in relation to the inferior pulmonary vein. These inspissated cysts did not obviously appear to be infected and the reason for their death can only be speculative, presumably associated with the heartbeat. Convalescence was normal.

Case 6. L.V.R.—White female, aged 24

Again an asymptomatic cyst lying on the left side of the superior mediastinum was found on routine X-ray (see Fig. 5). In contrast to cases 1 and 2, the longitudinal diameter was vertical and there was some lobulation. There was no widening of an intercostal space. The hydatid cyst was lying extrapleurally at the medial end of the third intercostal space. Unfortunately this cyst was also ruptured during removal.

Case 7. B.C.—Coloured male, aged 48

Routine mass radiographic examination showed this patient to be harbouring a symptomless cyst lying in the right anterior cardiophrenic region (see Fig. 6, *a* and *b*). At thoracotomy, the cyst was found to be extrapleurally situated and to arise from the diaphragm without any hepatic connection. The cyst was readily removed *in toto*.

DISCUSSION

The route of infection in these cases is somewhat difficult to explain except on a fortuitous basis. The usually accepted route of infection in hydatid disease is from the bowel to the liver as the first filter, where perhaps 50% of ova settle,

particularly the larger ones; thence to the lungs, where some 25% are filtered out; and finally to the heart by the coronary vessels and to the body in general. An alternative entrance might be by direct inhalation of ova in dust to the lungs. By either route, it would be reasonable to expect pulmonary hydatids in association with mediastinal ones and D'Abreu⁵ in his book makes a brief note that these cysts are 'almost invariably secondary to hydatid disease of the lung'. In this series of 7 cases, however, there was only one in which a presumptive diagnosis of pulmonary hydatid cyst could be made in retrospect (case 4), which tends to rule out metastatic venous secondary echinococcosis. In the case with 6 cysts there was no evidence of pulmonary disease. Thus the possibility of lymphatic spread from the bowel *via* the thoracic duct must be borne in mind. The mediastinal cysts may be either anterior or posterior, so that lymphatic spread in all cases is unlikely; but 3 of the patients in this series had single cysts high on the left and posteriorly. Possibly cardiac and aortic pulsation may prevent development lower along the thoracic duct; though, in case 5, 2 of the cysts in relation to the pulmonary ligament would be close to the duct and might have developed from it. It would be difficult to postulate lymphatic spread for the other cases and these must presumably be haematogenous, settling fortuitously in the mediastinum. However, the question has been raised in the past whether the preponderance of hepatic and pulmonary cysts does not indicate some organ affinity rather than mere filtration from the blood. No answer to this possibility has as yet been offered.

With multiple cysts one is tempted to consider that there was an original single cyst which ruptured in a mobile mediastinum, owing either to cardiac pulsation or to external trauma. This is said usually to be the case with pericardial cysts, which develop as a result of the rupture of a cardiac cyst. In case 5, however, there seemed to be only 1 pericardial cyst and there was no evidence of a cardiac one. The pericardial cavity was completely obliterated, as apparently is often the case; a certain degree of constriction of the pericardium has been reported, attributable to the irritant effects of the hydatids, but it was not evident here. Solitary pericardial cysts are uncommon, but they may be associated with pain or symptoms caused by pericardial effusion.

Two of these cysts were inadvertently ruptured during removal, but no recurrence has been noted, in one case over a period of 6 years. This accords with our experience with pulmonary cysts, where we have seen no recurrences although cysts have ruptured during removal. The reason seems to lie in the fact that the 'thin' cysts, which are so liable to rupture with the slightest manipulation, are in fact undisturbed acephalocysts lacking the stimuli to the formation of brood capsules or scolices. According to Dew,⁶ who stressed the persistence of the parasitic elements, any of these may, if shed into the tissues under aseptic conditions, implant themselves and give rise to secondary cysts. There seems little doubt that fragments of the original germinal membrane may also lay down protective laminated membrane around islets of nuclear material and may give rise to cysts. These secondary cysts, however, are of very slow growth and may take from 5 to 12 years to be obviously manifested, thus lulling the surgeon into optimistic misinterpretation. It may be that that is the case in the series reported here.

The rate of growth is illustrated to some extent in these

cases. All presented in early adult life, which suggests that infection took place at an early age. Case 4 seems to have already had a cyst in the lung at the age of 3, although the mediastinal one was only of medium size 2 decades later. In case 5, the radiological growth was in the region of 1 cm. per year during observation. One cannot but feel that the rate of growth varies from cyst to cyst and even from time to time in the same cyst, perhaps according to the blood supply.

SUMMARY

Seven cases of hydatid disease of the mediastinum are reported, seen in recent years at the thoracic surgical unit

of Groote Schuur Hospital. One intrapericardial cyst is included.

The possible route of infection and rate of growth are discussed and some of the literature referred to.

Our thanks are due to Mr. W. L. Phillips, who operated on some of these patients; to Prof. J. H. Louw and Dr. J. G. Burger for permission to publish; and to Mr. B. Todt for the radiological reproductions.

REFERENCES

1. Ringertz, N. and Lidholm, S. O. (1956): *J. Thorac. Surg.*, 31, 458.
2. Heuer, G. J. and Andrus, W. D. (1940): *Amer. J. Surg.*, 50, 143.
3. Hirschfeld, K. (1952): *Austral. N.Z. J. Surg.*, 21, 27.
4. Windsor, H. M. (1954): *Brit. J. Surg.*, 41, 541.
5. D'Abreu, A. L. (1958): *A Practice of Thoracic Surgery*, 2nd ed., p. 482. London: Edward Arnold.
6. Dew, H. R. (1930): *Brit. J. Surg.*, 18, 275.

DOCUMENTATION IN ANAESTHESIA

BERIC JACKSON, M.B., B.S., *Department of Anaesthetics, King Edward VIII Hospital and University of Natal, Durban*

Hippocrates is spoken of as the Father of Medicine. Probably there were physicians before him who were almost as able, and the reason why he is famed and revered is that he and his pupils led the way in accurately documenting their cases; their clinical descriptions of disease are quoted even today. This documentation had two important results, viz. (1) it raised medicine from the status of magic to an occupation of rational endeavour, and (2) it promoted the development of medical science. For medicine to develop it has been necessary for each generation of doctors to receive the recorded knowledge left by their predecessors; by adding their own contribution to this knowledge they have been able to lighten the darkness of suffering humanity.

Documentation has been as necessary to the progress of anaesthesia as in the other branches of medicine.

Apart from these considerations, why should the anaesthetist keep written case records? The answer is that it is his duty to ensure that the patient presenting for operation is in the best possible condition, and a history, general physical examination, and documentation by the clinician and the anaesthetist, will help to prevent any oversight in the pre-operative assessment of the case. In all major or prolonged operations it is also advisable for the anaesthetist to keep a written record of the condition of the patient so that he may be aware early of the development of any undesirable trends in the patient's physiology.

I will mention a few points that are of interest to the anaesthetist from the point of view of documentation, and later suggest what I think ought to be documented.

Exercise Tolerance

The patient's exercise tolerance is the most important single indication of his condition that is available to the anaesthetist. Almost all serious disabilities in the cardiovascular or respiratory systems that are likely to prejudice the course of anaesthesia will be brought to light from this enquiry. If a patient cannot perform normal physical activities, when due consideration is given to overweight and lack of exercise, or if there is a recent falling-off in exercise tolerance, further investigation will usually disclose a reason. On the other hand, if the patient can undertake normal activities, he will almost certainly stand up to his operation well.

This brings us to the evaluation of the operative risk in the presence of heart disease. A mistaken assessment of the cardiovascular system, and of the heart in particular, may have the most disastrous and irrevocable consequences. A careful history and clear documentation will greatly help towards a correct assessment, and it will be found useful to record data under the following 4 headings, viz. (1) aetiology, (2) anatomical lesion, (3) rhythm, and (4) functional capacity of the heart.

1. *Aetiology.* Where possible the aetiology of the heart disease should be noted down and consideration given to the general pathology of the underlying disease. If, for example, this is rheumatic fever, the anaesthetist will be led to examine the function of the heart valves that are particularly affected. He will also bear in mind the possibility of such complications as subacute bacterial endocarditis or active carditis.

2. *Anatomical lesion.* When lesions of the aortic valve exist,

special care must be taken during anaesthesia to avoid a drop in blood pressure or cardiac output, which may seriously reduce the coronary blood flow. A marked narrowing of the mitral valve may be accompanied by a greatly increased tendency to develop pulmonary oedema with extreme suddenness, if the heart is subjected to an increased load or a reduced oxygen supply.

3. *Rhythm.* Auricular fibrillation presents little increased risk by itself provided that the ventricular rate, if rapid, is controlled with digitalis. On the other hand, when ventricular arrhythmias or arhythmias due to conduction defects in the atrioventricular bundle are present, the associated pathology will add to the risk of heart failure during or after the anaesthetic.¹

4. *Functional capacity* of the heart may be equated with 4 grades of exercise tolerance, as follows:

Grade 1: Patients have a heart lesion but are symptom-free on exertion.

Grade 2: Patients can perform all activities except heavy exertion.

Grade 3: Patients have symptoms of cardiac decompensation on light exertion.

Grade 4: Patients have signs or symptoms of cardiac decompensation even at rest.

A diseased or congenitally deformed heart will stand operation well if the functional capacity falls into grade 1 or grade 2. Generally there is no increased operative risk and operations can safely include those which are undertaken purely for the comfort of the patient. Patients in grade 3 and grade 4 can be considered as increased anaesthetic risks, and should only be subjected to operations involving a general anaesthetic if they are thought necessary in spite of this risk, which is slight in grade 3, and more marked in grade 4.

The anaesthetic risk in patients with a history of myocardial infarction is in accordance with this grading, except that after an infarction the patient is an excessive hazard for the first 6-8 weeks, until fibrosis is sufficiently advanced in the infarcted area, until the risk of pulmonary and systemic emboli is reduced, and until the surrounding non-functional but surviving areas of the myocardium have become functional as the meagre collateral blood supply develops. It is wiser after infarction to postpone any operation for 6 months if possible.

Anaemia

As a general working rule, a patient whose haemoglobin is less than 10 g. % should be treated for anaemia before undergoing an elective operation. If a patient with anaemia is submitted to operation it is worth remembering that he would die from a smaller blood loss than a normal individual in the same circumstances, and that he would suffer irreversible tissue damage sooner if a period of anoxia should complicate the anaesthesia. In patients with rapidly growing cancers or cancers of the gastro-intestinal tract, severe anaemia, together with deficiencies of blood proteins, is often accompanied by a loss of weight and a reduced blood volume. When the weight loss represents 10% of the body weight a reduced blood volume can be assumed² and the loss in blood volume corrected by giving 30-40 c.c. of blood per lb. of weight lost. In the above circumstances the transfusions should be given

before the heart it about 8 increased stances it

Anaesthetic an art. or self-identified more true most des patients 'skill' given to detail.

It is trauma a that the There are the general would be from the individual sound as measure

The Pulse

Palpation very real in a way anaesthetic advance to get a periphery after inc the patient it is very anaesthetic may be a drugs as neostigmin and haem rate is no

Blood Pro

Records few meas common taking so and diast or if it is that the in a state satisfact found th usually in radial ar and in the Knowl individua output, t is early marked when tim warrant which m the time

Relation

When 1,000 but a p anaesthetic At opera the actual very use proportion When bl ment, th

before the day of operation. When there is a possibility of a failing heart it should be remembered that each unit of blood contains about 8 g. of sodium chloride and sodium citrate, and that the increased plasma volume may overload the heart; in such circumstances it is safer to use packed cells for pre-operative transfusion.

DOCUMENTATION DURING ANAESTHESIA

Anaesthesia may be considered as an applied science rather than an art. Because a large proportion of human ailments are trivial or self-limiting, human kindness and understanding have been identified with the so-called 'art of medicine'. These qualities might more truthfully be termed the 'art of medical practice'. They are most desirable in an anaesthetist, but they are not enough, because patients do not necessarily recover after anaesthetics, and even 'skill' gives precedence to applied knowledge and a close attention to detail. Documentation is merely a part of this attention to detail.

It is by recording the measurements of the effects of drugs, trauma and haemorrhage on the patient during and after anaesthesia that the anaesthetist can gain a sound knowledge of his craft. There are some who rightly emphasize the importance of observing the general condition of the patient during the operation, but it would be fallacious to think that this is achieved by standing back from the scene of action like an artist surveying his picture. Individual measurements when added together, will help to give a sound assessment of the patient's condition; so let us discuss some measurements.

The Pulse

Palpation of the pulse wave in a peripheral artery is always very reassuring to the anaesthetist. Each case anaesthetized is in a way a physiological experiment, in that the effects of the anaesthetic and the surgery on the patient are not predictable in advance with certainty. Because of this uncertainty, it is necessary to get a 'base-line reading', and it is a useful habit to palpate a peripheral artery just before starting the anaesthetic. At any time after induction, particularly immediately after induction, when the patient does not appear to be reacting in the expected manner, it is very useful to know what the pulse felt like before the anaesthetic began. The pulse rate before and after the operation may be a useful clinical sign, but during anaesthesia the use of such drugs as belladonna, gallamine triethiodide, chlorpromazine, and neostigmine, makes interpretation of the heart rate complicated, and haemorrhage is usually obvious, so that an increased heart rate is not of particular help by itself in such circumstances.

Blood Pressure

Recording of the blood pressure by auscultation is one of the few measurements of the cardiovascular function which anaesthetists commonly have the facilities for making, and it is worth while taking some trouble to obtain satisfactory readings of the systolic and diastolic pressures. If the stethoscope is placed inaccurately, or if it is placed correctly but the arm is subsequently rotated so that the diaphragm is no longer over the artery, or if the artery is in a state of spasm because of a rapid infusion of cold blood, a satisfactory measurement may be difficult to obtain. It has been found that when the systolic blood pressure is below 60 mm. Hg, usually in vasoconstriction following blood loss, palpation of the radial artery and auscultation of the brachial artery are unreliable,³ and in these circumstances an oscillometer is most useful.

Knowledge of the pulse pressure is of value because in any one individual it is proportional to the stroke volume and to the cardiac output, the heart rate being taken into account. The pulse pressure is early reduced in cases of unreplaced blood loss, prior to any marked fall in systolic blood pressure. There are a few occasions when time-consuming measurements by the anaesthetist are unwarranted and are likely to divert his attention away from matters which more urgently require his attention, but usually he has all the time in the world!

Relation of Blood Pressure to Haemorrhage

When blood is withdrawn from conscious volunteers, between 500 and 1,000 ml. may be removed before the systolic pressure drops, but a patient who has been starved, premedicated and then anaesthetized has not nearly the same capacity for compensation. At operation, the fall in blood pressure and pulse pressure follows the actual blood loss closely enough to make these measurements very useful in assessing and replacing blood loss. In a small proportion of all operations, it is necessary to weigh the blood loss. When blood is being lost at operation without adequate replacement, the fall in blood pressure seldom follows a regular curve,

but takes the form of progressive falls each followed by periods of compensation, until finally collapse occurs. Recovery often follows the reverse pattern, and when blood replacement has been inadequate it is not unusual to register a fairly satisfactory blood pressure, and to find later that this pressure has not been maintained (Fig. 1).

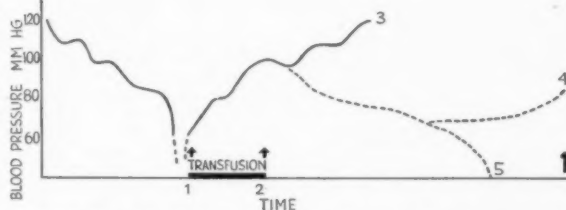


Fig. 1. Illustrating the irregular fall in blood pressure often seen as a result of blood loss at operation. A transfusion is started at (1), and a blood-pressure reading taken at the completion of transfusion at (2) will not necessarily indicate whether the shock will subsequently be adequately compensated (3), poorly compensated (4), or progressive (5).

Should a patient be hypovolaemic at the start of an operation even a small loss of blood may cause a marked fall in blood pressure. It is of interest that patients with diabetes insipidus are liable to pass into a state of shock after a blood loss that would not affect a normal person, probably because in the insipidus case the extracellular fluid volume is in a state of chronic slight depletion,⁴ and less fluid is available to replace what is lost from the circulation. A blood donor will suffer little upset in giving a pint of blood provided his extracellular fluid volume has been sustained by at least a drink within the previous 2 or 3 hours. This puts him in a position to withstand the blood loss in the circulation by providing a fluid shift into the capillaries when the capillary pressure falls as a result of the bleed. On the other hand, a donor who has missed his previous meal or drink frequently shows some temporary signs of shock after giving a pint of blood. The anaesthetist would do well to remember that his patient compares with this second donor in that food and fluid have often been withheld for many hours. Regular blood-pressure measurement by the anaesthetist will convince him that, after operations during which about a pint of blood has been lost, the patient will often have a blood pressure well below the normal pressure for some time, and that it will rapidly respond to an infusion of glucose water or saline. This infusion can be given with more advantage during the operation.

One or two points about the measurement and the significance of blood pressure and pulse have been mentioned. There are many measurements which an anaesthetist may elect to make which may help in particular circumstances, but the bodily systems likely to fluctuate most during anaesthesia are probably the respiratory and cardiovascular systems. Therefore the anaesthetist, particularly while training, should have at his disposal the means to measure the electrical activity of the heart, the venous pressure, and ventilation volumes and pressures. The automatic respirator and the electro-encephalogram will possibly be used much more frequently in the future at the larger medical centres because they facilitate a more precise control of respiration and cerebral activity.

Function of Documentation

Now let us come back to review the function of documentation. Before operation documentation of the history and the physical condition of the patient helps to ensure that major points in his assessment will not be overlooked. During the operation the patient is usually in good hands when his anaesthetist documents the case properly, for to do this the anaesthetist must be attentive. He has by the discipline of his training become a more competent observer, and has a better practical knowledge of drugs than if he had not been trained in this way. By developing these good habits while training, the anaesthetist will also be in a position to assess the teachings of his predecessors and to make a contribution to his calling, which is the essence of medical progress. Documentation also serves to make the anaesthetist more aware of any undesirable effects that the anaesthesia may have on the patient during the recovery period.

It is the obligation of the doctor committing the patient for operation to see that the general medical history and the physical

condition of the patient are documented. This being so, it is a duplication for the anaesthetist to rewrite routine clinical findings which are already in the notes. I feel that he should make a statement which includes the exercise tolerance, the haemoglobin level, the weight, and the blood pressure, and then only positive or pertinent negative findings in the history or clinical examination. As an example of pertinent negative findings, if albumin is found in the urine statements on its aetiology and on the renal function are pertinent even if negative. It is pertinent to note down that a baby presenting for a hare-lip repair is well nourished and free from upper respiratory or alimentary infection, though such a note would be unnecessary in a fit adult undergoing surgery of the hand. When cardiovascular disease has been found I think it necessary for the sake of the anaesthetist's perspective and judgment to set down systematic notes as described above, but should no such disease exist this writing would be a waste of time.

For these reasons an anaesthetic chart with a mass of standard pre-anaesthetic information to tick off or encircle is not the ideal. Similarly, charts which contain rows of drugs and require the anaesthetist to place a tick here and there at the completion of the operation fill little useful purpose.

It is the sequence of events and the drugs used in their relation to the patient's condition during anaesthesia which should be recorded; such a record is of benefit to the patient and to the anaesthetist. In research, the majority of investigations are planned in advance, and documentation of the factors under consideration are

seldom facilitated by an elaborate printed standard anaesthetic chart.

The chart I favour contains headings for the patient's name, age, sex, etc., and his disease, exercise tolerance, weight, haemoglobin and blood pressure; the amount of blood lost and of blood and other intravenous fluids given; premedication; and operative and post-operative notes. The chart is made of cardboard of adequate size to give space for documentation. Whatever chart is used, its value to the anaesthetist is lessened if it is lost to him in the hospital records. These charts should be kept in the anaesthetic department, where they may be scrutinized and where they represent the work and the progress of individual anaesthetists and the department as a whole.

SUMMARY

The role of documentation in the development and application of clinical anaesthesia, which includes aspects of interest in the pre-operative and operative phase, is discussed.

I should like to thank Dr. H. Grant-Whyte for his interest and help in this paper.

1. Maher, C. C., Flack, H. A. and Smyth, G. A. (1955): *Surg. Clin. N. Amer.*, 38, 1181.
2. Denson, J. S. and Shapiro, E. (1959): *Ibid.*, 43, 1195.
3. Stephen, C. R., Woodhall, B., Odom, G. L., Reynolds, D., Bourgeois-Gavordin, M., Martin, R. C. and Bloor, B. M. (1956): *Ann. Surg.*, 143, 143.
4. Guyton, A. C. (1956): *Textbook of Medical Physiology*, 1st ed., p. 329. Philadelphia: W. B. Saunders.

RADIATION HAZARDS*

J. K. McCABE, President, Border Branch, Medical Association of South Africa, 1959

In thinking about a suitable subject for this address I found that many of the possible choices have been ably dealt with in the past half-dozen years. The subject I have chosen appealed to me as one which has evinced much interest in our profession and among the general public during recent years. A great deal has



Dr. J. K. McCabe

been written on radiation hazards and risks have been frequently exaggerated, with the result that those not intimately connected with the use of ionizing radiations are apt to be confused by the welter of conflicting statements and opinions. As a profession our principal concern is with the delayed effects following diagnostic and therapeutic radiation. The most important of these effects are leukaemia and cancer.

It is my intention to review some of the work that has been done on this subject. The Medical Research Council report on 'The hazards to man of nuclear and allied radiations',¹ which was published in 1956, is a very important contribution and much of what I shall say is drawn from this excellent report.

THE EFFECTS OF IONIZING RADIATIONS

Ionizing radiations of which the common types are X-rays, gamma rays, alpha and beta particles and neutrons, are so called because they give rise to the formation of electrically charged particles, ions, in the matter through which they pass. X-rays and gamma rays can penetrate the whole body and it is with these that we are chiefly concerned. The biological effects are dependent on the intensity of the radiation and the period of exposure.

The effects we have to consider are (a) somatic, involving cellular damage and destruction, and (b) genetic, due to gene mutations. Our knowledge of the effects on human beings has been gained by the study of:

(i) The use of X-rays and radium in the treatment of disease, mainly cancer;

(ii) occupational hazards of radiologists, workers in the luminizing industry, and miners of radio-active ores;

(iii) The study of the victims of atomic bomb explosions; and

(iv) experiments on animals.

Leukaemia

Let us first consider radiation-induced leukaemia.

1. Atomic Bomb Explosions

The Atomic Bomb Casualty Commission of the United States Research Council has recorded the incidence of leukaemia in Hiroshima and Nagasaki following the atomic bomb explosions. During the period 1947-1954 Moloney² reports 92 cases among survivors. Of these 39 suffered from chronic myelogenous leukaemia, 25 from acute myelogenous leukaemia, and 14 from acute lymphatic leukaemia. The expected incidence in the same cities in an unexposed population would have been 25.

It is interesting to note that in survivors who were 2,000 metres or more distant from the explosion, the incidence of leukaemia was 2 cases in every 10,000 persons, whereas for those under 1,000 metres distant the incidence was 128 per 10,000. The average time lag before the first appearance of symptoms was 6 years. The incidence remained approximately constant up to the 9th year.

2. Deep X-ray Treatment of Ankylosing Spondylitis

Court Brown and Doll³ studied the incidence of leukaemia in 13-14,000 cases of ankylosing spondylitis treated with X-rays between 1933 and 1954. They found that the incidence increased with higher doses. The general incidence was approximately 10 times higher than the normal expectation, but was still only one-third of 1%. There was no increased incidence in a much smaller control series of 400 untreated cases. The latent period was about 6 years, similar to that in the Japanese cases, and the great majority were of the myeloid (not infrequently acute myeloblastic) type. In a later paper these authors concluded that the evidence suggested a linear relation between the cumulative dose of radiation and the biological effect—in this case leukaemia.⁴ Burnet⁴ quotes Faber in Denmark as having found an increased incidence of myeloid leukaemia in association with past exposure to X-rays, but not of chronic lymphatic leukaemia. Abbutt and Lea⁵ stated that there was an association between leukaemia and non-irradiated ankylosing spondylitis, but they also considered

* Valedictory Presidential Address, East London, 27 February 1960. Submitted for publication on 15 June 1960.

that radiation plays a major part in the production of leukaemia in cases of ankylosing spondylitis. There is, in fact, no doubt of this. However, a proper perspective must be maintained and I cannot do better than quote the comment of Sir Macfarlane Burnet, chairman of the Australian National Radiation Advisory Committee: 'Perhaps the most important thing to remember about the results of this investigation is the rarity of leukaemia, even after heavy dosage'.⁴ All authorities are agreed that deep X-ray therapy should continue to be used in the treatment of ankylosing spondylitis since the benefits conferred far outweigh the risks, and these will be significantly reduced by the more conservative approach to dosage and fields which has now been generally adopted.

3. Leukaemia in Radiologists

The incidence of leukaemia in American radiologists has been shown to be significantly higher than among their non-radiological colleagues (5-10 times) before the standards of protection were as high as they are now.^{6,7} In view of this, a most interesting investigation was conducted by Court Brown and Doll⁸ on behalf of the Medical Research Council. The expectation of life and mortality from cancer among British radiologists from 1897 to 1956 has been compared with those for comparable groups: (a) Social class I—an equivalent social group, and (b) doctors. These authors state in their summary: 'A study has been made of the causes of death of 1,377 male British radiologists (including Eire) during a 60-year period from 1897 to 1957. A comparison of the observed and expected numbers of deaths from all causes provides no evidence that occupational exposure to ionizing radiations has caused a detectable non-specific shortening of the expectation of life. This is particularly striking since the population includes most of the pioneer British radiologists, many of whom are known to have suffered from specific effects of over-exposure, that is, radiation dermatitis and skin cancer'.

However, there was a significant excess of cancer deaths in men entering the practice of radiology before 1921, the year in which the first committee to advise on protection was formed. The excess was confined to tumours of the skin and pancreas and (possibly) leukaemia.

There was no excessive mortality from cancer in men entering radiology after 1920, but it is perhaps a little early to make a full estimation of the hazard. There was an apparent increase in the incidence of leukaemia in the group, but the numbers were too small to justify conclusions.

4. Leukaemia in Children

The incidence of leukaemia (mostly acute) in children is highest between 3 and 4 years of age, reaching a peak (1950-1953) of about 60 per million.⁹ Stewart and her co-workers¹⁰ at Oxford published a preliminary report in 1956 which caused widespread anxiety regarding the apparent increased incidence in children irradiated *in utero* in the early months of pregnancy. In their subsequent paper in 1958¹¹ they gave the results of their completed survey of childhood malignancies. In this work they attempted to trace all the children in England and Wales who died of leukaemia or cancer before their 10th birthday (during the years 1953-1955) and to compare their pre-natal and post-natal experiences with those of healthy children. The total deaths consisted of 792 ascribed to leukaemia and 902 to other cancers (Registrar-General). Of the leukaemia group 677 and of the other cancers 739 were traced and the mothers interviewed.

It appeared from this work that children who have been X-rayed *in utero* are twice as likely to die of leukaemia or cancer before the age of 10, or, to put it another way, that 6-7% of all deaths from malignant disease before the age of 10 are due to abdominal X-ray examination of pregnant women. It was also considered that the frequency of exposure to X-rays in infancy was significantly higher for children, who subsequently died of leukaemia, than for other children. However, there was nothing to suggest that irradiation *in utero* explains the increase in recent years or the early peak of leukaemia mortality.

Further investigation is needed into the relation between low doses of radiation and the incidence of malignant disease, and into the radiosensitivity of the foetus as compared with the child and the adult. Possible genetic effects on the child have also to be taken into account. In the present state of our knowledge it is wise to avoid the abdominal irradiation of pregnant women where possible and to reduce it to the essentials where it is considered necessary.

5. Leukaemia in General

The (worldwide) incidence of leukaemia is increasing annually at the rate of about 4-5% per annum.⁴ Last year Court Brown and Doll¹² published a paper on 'Adult leukaemia—trends in relation to aetiology'. They concluded that:

1. The apparent increase in mortality due to chronic lymphatic leukaemia and a great proportion of the increase attributed to other types at ages over 60 is due to better recognition of these diseases.

2. The observed increase in death rates from acute leukaemia at ages under 60 is largely real and is due to leukaemogenic factors. Acute and chronic myeloid leukaemia are the forms of the disease which radiation is known to induce.

Cancer

Chronic exposure is well known to cause epitheliomata which metastasize relatively early. By 1911 no less than 54 cases of cancer of the skin were reported in the early radiologists and technicians. The average latent period was about 13 years. The condition is rarely seen today in this group of persons, but does still occur in the untrained. Cancer is also known to occur in heavily irradiated areas with a latent period of 20-30 years. There is evidence suggesting that cancer of the thyroid may occur in children after irradiation of the thymus or after irradiation of the neck for simple conditions. Cancer of the thyroid has also been reported in adults previously irradiated for conditions such as tuberculous glands of the neck, with a latent period of about 20 years. By 1959, 7 cases of acute leukaemia were reported following the treatment of hyperthyroidism with radio-active iodine.¹³ The general incidence of radiation-induced malignancy appears relatively small under modern conditions, and with increasing knowledge steps can be taken to reduce it still further.

Genetic Effects

Much experimental work has been done in this field with regard to plants and animals. Little is known of the genetic effects of radiation in human beings. Ionizing radiations are of genetic significance only in so far as they affect the reproductive cells in the reproductive organs and are, therefore, of no genetic significance in individuals beyond the reproductive age. Damage to genetic material is cumulative and irreversible. Natural background radiation is estimated to contribute about 3 r per generation to the gonadal dose and to account for something between 2 and 20% of human mutations. It is estimated that the level of genetically significant radiation currently received from diagnostic X-ray examinations in the United States is of about the same order of magnitude as that from natural background radiation;¹⁴ in Britain it is thought to be higher than 22%. This is by far the most important source of possible genetic damage in peace time and therapeutic radiation is thought to be next. The major part is contributed by examinations and treatment of a relatively few sites in the body and, bearing this in mind, a great deal can be done to reduce the risk. The present contribution from sources such as radio-active fall-out, luminizing paints, etc. is relatively small. Current levels of gonadal radiation are not thought to constitute a serious genetic hazard to the population as a whole. The tale will be unfolded only by the study of future generations. It is our present obligation to take every care to avoid unnecessary exposure of the gonads in children and in individuals during their reproductive life.

There is no evidence that infertility is produced under modern conditions of occupational exposure, nor is there any evidence that menstrual disorders are caused.

Abuse of Diagnostic Radiation

My talk would be incomplete without reference to this unhappy aspect of the subject. Notwithstanding all that has been written in the past 40 years there are still colleagues untrained in radiology, who use diagnostic machines without regard to their own safety or that of their patients. Fractures are still being diagnosed and set under screen control using small portable units. Some tuberculosis clinics are still attempting to diagnose pulmonary tuberculosis by screening, in one case using up to 7 m.a.—more than twice the permissible milliamperage. Fingers are still being burned and avoidable lethal epitheliomata are still occurring. Dr. Maurice Weinreb,¹⁵ who is a member of the Radiation Hazards Commission recently appointed by the Government, told me that he has seen examples of these incidents in recent months. The public

are becoming radiation-conscious and suits for damages are on the increase.

PROTECTION

It is obvious that it is the duty of all who use ionizing radiations in the diagnosis and treatment of disease to be thoroughly conversant with the accepted standards of protection and to be in possession of the international recommendations as amended from time to time. I might mention here that important contributions on protective measures have appeared in the South African literature.¹⁶⁻¹⁸

Points which require emphasis today include:

1. Careful coning, filtration, and shielding of the gonads in children.

2. Coning and shielding of the lower part of the trunk in examinations of the upper half of the body, to avoid irradiation of the gonads.

3. Cooperation between referring doctor and radiologist in assessing the indications for diagnostic X-ray examinations involving direct irradiation of the gonads. Radiation pelvimetries should rarely be necessary today, and abdominal irradiation of pregnant women should be reduced to the essential minimum.

4. Screening and major diagnostic procedures should be undertaken only by those with the necessary special training.

5. Avoidance, as far as possible, of the use of ionizing radiations in the treatment of non-malignant conditions in children, particularly about the head and neck and in the neighbourhood of the gonads, and in the treatment of non-malignant conditions involving irradiation of the gonads during reproductive life.

6. Radio-active isotopes should not be used for the treatment of non-malignant conditions in children and young people, and should be avoided where possible during reproductive life.

The future development of civilization is bound up with the exploitation of nuclear energy. Its use, like that of other sources

of energy, entails risk, but the risk is controllable and, within limits, can be accepted. It is the scale and not the nature of the hazard that is new, for human populations have always been exposed to natural radiation of low intensity.¹

CONCLUSION

Most of the important additions to our medical armamentarium since the turn of the century have had their associated hazards, and ionizing radiation is no exception. The enormous benefits far outweigh the risks. While there is no cause for alarm, there is certainly need for caution. The more we know of the nature and extent of the hazards, the better are we equipped to avoid them.

I wish to thank Dr. Maurice Weinbren for his letter and my partners, Dr. B. Navid and Dr. H. Bloch, for their helpful suggestions and assistance with references.

REFERENCES

1. The hazards to man of nuclear and allied radiations (1956): Medical Research Council Report. London: H.M. Stationery Office.
2. Moloney, W.C. (1955): *New Engl. J. Med.*, 253, 88.
3. Court Brown, W. M. and Doll, R. (1957): *Spec. Rep. Ser. Med. Res. Coun. (Lond.)*, No. 295.
4. Burnet, M. (1959): *S. Afr. Practit.*, 4, 27.
5. Abbott, J. D. and Lea, A. J. (1958): *Lancet*, 2, 880.
6. March, H. C. (1950): *Amer. J. Med. Sci.*, 220, 282.
7. Warren, S. J. (1956): *J. Amer. Med. Assoc.*, 162, 464.
8. Court Brown, W. M. and Doll, R. (1958): *Brit. Med. J.*, 2, 5090.
9. Hewitt, D. (1955): *Brit. J. Prev. Soc. Med.*, 9, 81.
10. Stewart, A., Webb, J., Giles, D. and Hewitt, D. (1956): *Lancet*, 2, 447.
11. Stewart, A., Webb, J. and Hewitt, D. (1958): *Brit. Med. J.*, 1, 1495.
12. Court Brown, W. M. and Doll, R. (1959): *Ibid.*, 1, 1063.
13. Jacot, H. W. and Kligerman, M. M. (1960): *Year Book of Radiology 1959-60*. Chicago: Year Book Publishers.
14. Kaplan, H. S. (1958): *Amer. J. Roentgenol.*, 80, 696.
15. Weinbren, M. (1960): Personal communication.
16. Editorial (1957): *Med. Proc.*, 3, 413.
17. Fainsinger, M. H. (1957): *Ibid.*, 3, 422.
18. Jackson, H. (1958): *Ibid.*, 4, 541.

WORLD LIST OF FUTURE INTERNATIONAL MEETINGS

ALTERATIONS AND ADDITIONS NOTIFIED DURING JUNE 1960

World Health Organization, Expert Committee on Malaria, Geneva, 25-30 July 1960. Palais des Nations, Geneva, Switzerland.

Fifth International Poliomyelitis Congress, Copenhagen, 26-28 July 1960. Secretariat, c/o K. M. Ahlmann-Ohlsen, 5 Tuborgvej, Hellerup, Denmark.

Tenth International Symposium on the Neurovegetative System, Freudenstadt, Germany, 29-30 July 1960. Prof. Dr. A. Sturm, c/o Medizinische und Nervenkl. der Städtischen Kranken-Anstalten, Wuppertal-Barmen, Germany.

International Congress of Psychology, 16th, Bonn, 31 July - 6 August 1960. Prof. G. J. von Allesch, Psychol. Institut der Universität, Am Hofle, Bonn, Germany.

World Health Organization, Expert Committee on Public Health Administration, Meeting on Planning of Public Health Services, Geneva, 1-6 August 1960. Palais des Nations, Geneva, Switzerland.

Fifth International Congress of Gerontology, San Francisco, 7-14 August 1960. Louis Kuplan, Executive Secretary, 722 Capitol Ave., Sacramento, California, USA. Preceded by International Research Seminar on Social and Psychological Aspects of Aging, Los Angeles, 1-5 August.

World Federation for Mental Health, 13th Annual Meeting, Edinburgh, 8-13 August 1960. 19 Manchester Street, London. W.1. Preceded by London Conference on Scientific Aspects of Mental Deficiency, 24-29 July.

World Health Organization, Regional Committee for Africa, 10th Session, Accra, Ghana, 8-13 August 1960. Boite Postale 6, Brazzaville, Congo Republic.

Scandinavian Gynaecologists Congress, Helsinki, 18-20 August 1960. Suomen Lääkäriliitto, Ullanlinnankatu 1, Helsinki, Finland.

World Health Organization, Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel, Meeting on Preventive Aspects in the Teaching of the Basic Medical Sciences, Geneva, 22-27 August 1960. Palais des Nations, Geneva, Switzerland.

International Council of Psychologists, Annual Meeting, Chicago, 1-7 September 1960. Dr. Carol C. Bowie, Secretary, 602 Witherspoon Ave., Henderson, N.C., USA.

International Congress on the History of Medicine, 17th, Athens and Cos, Greece, 4-14 September 1960. Dr. S. Oeconomos, Congress President, 3 rue Grivéon, Athens, Greece.

Society for Biological Rhythm, 7th Conference, Siena, Italy, 5-7 September 1960. Dr. A. Sollberger, Department of Anatomy, Karolinska Institutet, Solnavägen 1, Stockholm 60, Sweden. In conjunction with the conference of the International Basimetric Society, 7 September.

International Congress of Beauty Care and Cosmetology, 14th, Amsterdam, 5-9 September 1960. ANBOS, P.O. Box 5017, Amsterdam-Zuid, Netherlands.

World Health Organization, Study Group on Arthropod-borne Viruses, Geneva, 5-10 September 1960. Palais des Nations, Geneva, Switzerland.

Ninth International Congress of Bronchoesophagology, Venice?, 8 or 10 September 1960. Dr. Chevalier L. Jackson, 3401 N. Broad St., Philadelphia 40, Pa., USA.

Symposium on Hematology, Kyoto, 12 September 1960. Organizing Committee, 8th International Congress, International Society of Hematology, c/o Science Council of Japan, Ueno Park, Taito-ku, Tokyo, Japan.

World Health Organization, Expert Committee on Specifications for Pharmaceutical Preparations, Sub-Committee on

non-Proprietary Names, Geneva, 12-15 September 1960. Palais des Nations, Geneva, Switzerland.

International Union of Biological Sciences, Section of Embryology, General Assembly, Pallanza, Italy, 15-20 September 1960. Prof. S. Ranzi, Instituto di Zoologia, Via Celoria 10, Milan, Italy. Symposium on Advances since 1945 in our Knowledge of Germ Cells and Earliest Stages of Development is also being held.

Red Cross International Blood Transfusion Seminar, 2nd, Tokyo, 17-18 September 1960. League of Red Cross Societies, 40 rue du 31 Décembre, Geneva, Switzerland.

World Health Organization, Expert Committee on Insecticides, Meeting on Disinsectionization of Aircraft, Geneva, 19-24 September 1960. Palais des Nations, Geneva, Switzerland.

World Health Organization, Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel, Meeting on Use and Training of Auxiliary Personnel in Medicine, Nursing, Midwifery and Sanitation, Geneva, 19-24 September 1960. Palais des Nations, Geneva, Switzerland.

International Society for Fat Research, 5th Congress, Gdansk, Poland, 21-23 September 1960. Politechnika, Katedra Technologii Tłuszczów, Gdansk, Poland.

World Health Organization, Expert Committee on Radiation, Meeting on Diagnosis and Therapy of Radio-active Poisoning, Geneva, 26 September-1 October 1960. Palais des Nations, Geneva, Switzerland.

First International Congress on Medical Photography and Cinematography, Cologne, 27-30 September 1960. Deutsche Gesellschaft für Photographie, Neumarkt 49, Cologne, Germany.

Commission for Technical Cooperation in Africa South of the Sahara, Panel of Correspondents on Nutrition, 8th Meeting, Washington D.C. September 1960. Pvt. Mail Bag 2359, Lagos, Nigeria.

Symposium on Cell Biology, Leiden, September 1960. Dr. A. F. Bruun, Secretary General, International Union of Biological Sciences, c/o Zoological Museum of the University, Krystalgade, Copenhagen, Denmark.

World Health Organization, Regional Committee for Europe, Training Course on Rehabilitation of the Physically Handicapped Adult, United Kingdom, September 1960. 8 Schervigvej, Copenhagen Ø, Denmark.

World Health Organization, Study Group on the Quality Control of New Pharmaceutical Preparations, Geneva, 3-7 October 1960. Palais des Nations, Geneva, Switzerland.

IN DIE VERBYGAAN : PASSING EVENTS

Research Forum, University of Cape Town. The next meeting of Research Forum will be held on Wednesday 27 July at 12 noon in the Bennie de Wet Lecture Theatre, A-floor, Groote Schuur Hospital, Observatory, Cape. Dr. J. D. L. Hansen will speak on 'The nutritive value of supplemented maize for children'. All who are interested are invited to attend this meeting.

Edenvale Hospital, Johannesburg. Clinical Discussions Club. On Wednesday 3 August Dr. J. H. S. Gear will give a lecture on 'Recent advances in virology' at 8.15 p.m. in the Board Room of the Hospital. All general practitioners and hospital medical staff are invited to attend this meeting.

National Group of Neurologists, Psychiatrists and Neurosurgeons (M.A.S.A.), Annual Congress. The Annual Congress of this Group will be held in Johannesburg from Thursday 29 September to Saturday 1 October. It is hoped that meetings will be held at the Princess Nursing Home, both in the neurological and neurosurgical departments; at Tara Hospital and at Baragwanath Hospital. An interesting social programme has also been arranged. Members wishing to present papers at

World Health Organization, Expert Committee on Mental Health, Meeting on Programme Development in the Mental Health Field, Geneva, 3-8 October 1960. Palais des Nations, Geneva, Switzerland.

World Health Organization, Expert Committee on Addiction-producing Drugs, Geneva, 10-15 October 1960. Palais des Nations, Geneva, Switzerland.

World Health Organization, Expert Committee on Cardiovascular Diseases and Hypertension, Geneva, 10-15 October 1960. Palais des Nations, Geneva, Switzerland.

Symposium on Occupational Dermatoses, Prague, 12-15 October 1960. Dr. Guido Hornstein, General Secretary of the Symposium, Dermatological Clinic of the Medical School of Hygiene, Srobarova 50, Prague 12, Czechoslovakia.

International Social Security Association, Permanent Medico-social Committee, Geneva, October 1960. 154 rue de Lausanne, Geneva, Switzerland.

International Conference on Muscle as a Tissue, Philadelphia, 3-4 November 1960. Dr. Kaare Rodahl, Director of Research, Lankenau Hospital, Lancaster and City Line Ave., Philadelphia 31, Pa, USA.

Food and Agriculture Organization of the United Nations/World Health Organization, Expert Committee on Nutrition, Geneva, 14-19 November 1960.

Commission for Technical Cooperation in Africa South of the Sahara/Food and Agriculture Organization of the United Nations, Symposium on Tuberculosis, Nairobi, Kenya, 16-22 November 1960. Pvt. Mail Bag 2359, Lagos, Nigeria.

World Health Organization, Expert Committee on Maternal and Child Health, Geneva, 21-26 November 1960. Palais des Nations, Geneva, Switzerland.

World Health Organization, Expert Committee on Specifications for Pharmaceutical Preparations, Geneva, 28 November-2 December 1960. Palais des Nations, Geneva, Switzerland.

International Symposium on Neuroradiology, Milan, November 1960. Società Italiana di Radiologia Medica e Medicina Nucleare, Corso Bramante 83, Turin, Italy.

World Health Organization, Expert Committee on Health Statistics, Geneva, 5-10 December 1960. Palais des Nations, Geneva, Switzerland.

World Health Organization, Expert Committee on Professional and Technical Education of Medical and Auxiliary Personnel, Meeting on Recommended Requirements for Schools of Public Health, Geneva, 12-17 December 1960. Palais des Nations, Geneva, Switzerland.

the Congress should inform Dr. C. Shubitz, 317 Lister Building, Jeppe Street, Johannesburg (for papers of psychiatric or neurological nature) or Mr. E. M. Kerr, Princess Nursing Home, Esselen Street, Hillbrow, Johannesburg (for papers dealing with neurosurgery or electroencephalography). Further information will be published as soon as it becomes available.

South African Paediatric Association (M.A.S.A.), Cape Town Sub-Group. The next meeting of this Sub-Group will be held on Tuesday 2 August at 8.15 p.m. in the Lecture Theatre, Red Cross War Memorial Children's Hospital, Rondebosch, Cape. Dr. James Marshall will speak on 'Skin problems in childhood with particular reference to fungus disease'. Visitors are welcome to attend this meeting.

Southern African Cardiac Society, Cape Province Section. Dr. C. N. Barnard will speak on 'Advances in cardiac surgery' at a meeting of this Society to be held on Thursday 28 July in the E-floor Lecture Theatre, Groote Schuur Hospital, Observatory, Cape, at 8.15 p.m. Dr. Barnard has recently returned from a visit to the USSR, the USA and the UK.

University of Cape Town and Association of Surgeons of South Africa (M.A.S.A.), Joint Lectures. The next lecture in this series will be held on Wednesday 27 July at 5.30 p.m. in the E-floor Lecture Theatre, Groote Schuur Hospital, Observatory, Cape. Dr. C. N. Barnard will speak on 'Surgery in Russia and the USA'. All members of the Medical Association are welcome to attend this lecture.

South African Institute for Medical Research, Johannesburg, Staff Scientific Meeting. The next meeting will be held on Monday 1 August at 5.10 p.m. in the Institute Lecture Theatre. Dr. H. B. W. Greig will speak on 'Studies on fibrinolysis, with particular reference to the role of lipids'.

The Cape Town Mothers' Clinic, established to advise mothers on family spacing, has issued its annual report for the year ended 31 March 1960. The new cases attending the 8 branches of the clinic numbered 102 Europeans and 1,098 non-Euro-

peans, and the total attendances comprised 5,018 (454 Europeans and 4,564 non-Europeans). The expenditure during the year amounted to £1,099 18s. 7d. The majority of the cases seen at the clinics were referred by doctors, hospitals, and other health authorities.

Universiteit van Stellenbosch en Karl Bremer-hospitaal, Bellville, Kaap — Vierde Jaardag. Die vierde jaarlikse Jaardag van die Karl Bremer-hospitaal vind vanjaar op Donderdagmiddag en Vrydag, 8 en 9 September, in die Burgersentrum te Bellville plaas. Referate en uitstallings sal gelewer word deur die geneeskundige personeel van die Karl Bremer-hospitaal en dosente van die Fakulteit van Geneeskunde van die Universiteit van Stellenbosch. Alle geneeshere en belangstellendes is welkom om die verrigtinge van die dag by te woon. Verversings word aangebied. Daar sal ook uitstallings deur farmaseutiese maatskappye gereël word. 'n Volledige program sal later gepubliseer word.

NUWE PREPARATE EN TOESTELLE : NEW PREPARATIONS AND APPLIANCES

PALADAC

Parke, Davis Laboratories (Pty.) Ltd., introduce Paladac, a palatable, orange-flavoured, multi-vitamin supplement readily accepted by the young patient and also eminently suitable for those adolescents and adults who prefer liquid medication.

Paladac supplies 7 essential vitamins in a concentrated, readily-absorbable form, specially formulated to meet the daily requirements of children in the 3 - 100 year group!

Each teaspoonful of Paladac supplies vitamins A, B₁, B₂, B₆, C and nicotinamide in amounts exceeding the minimum daily requirements as estimated by the BMA Nutrition Committee in 1950; and physiologic amounts of vitamin B₁₂ and pantothenic acid.

Formula

Each teaspoonful (5 c.c.) contains: Vitamin B₁₂ (cyanocobalamin, U.S.P.) 3 µg., vitamin C (ascorbic acid, U.S.P.) 50 mg., vitamin A 5,000 units, vitamin D 1,000 units, vitamin B₁

(thiamine HCl., U.S.P.) 3 mg., vitamin B₂ (riboflavin, U.S.P.) 3 mg., vitamin B₆ (pyridoxine HCl., B.P.C.) 1 mg., nicotinamide (niacinamide U.S.P.) 20 mg., and pantothenic acid (as the sodium salt) 5 mg.

Indications

1. Prevention and treatment of vitamin deficiencies, particularly in children.
2. Convalescence following debilitating illness.
3. Restricted diets and poor appetite.
4. Underweight.
5. Lowered vitality.

Dosage and Administration

One teaspoonful, or more, daily according to requirements.

Supply

Paladac is supplied in bottles of 4 and 16 fl. oz.

Further information may be obtained from Parke Davis Laboratories (Pty.) Ltd., P.O. Box 24, Isando, Tvl.

BOEKBESPREKINGS : BOOK REVIEWS

PERIPHERAL FACIAL PALSY

Peripheral Facial Palsy. Pathology and surgery. By K. Kettel, M.D. Pp. 341, 127 figures. 120s. Oxford: Blackwell Scientific Publications Ltd. 1959.

Dr. Karsten Kettel is chief surgeon in the department of otorhinolaryngology at the Frederiksberg Central Hospital, Denmark. He is widely known as an authority on peripheral facial-nerve palsy, and has acquired an impressive personal experience in this field. This monograph is based on the experience gained in 311 facial-nerve operations (233 facial-nerve decompressions and 78 nerve-grafting and nerve-suture operations). This is a large series and his views must therefore command respect.

The monograph covers peripheral facial palsy in all its aspects and, apart from his own views on the subject, Dr. Kettel has been most generous in his acknowledgement of significant contributions by other workers in this field. The bibliography is indeed an exhaustive one and this further enhances the value of the book.

It is clear that there are knotty problems still to be solved, and their solution depends on cooperation and team-work between the specialist in physical medicine, the physiologist, the neurologist, and the otologist. For this reason, ideally, cases of peripheral facial paralysis should be referred to specialized centres with the necessary personnel and equipment for adequate investigation and treatment.

Risking an accusation of pettiness, the reviewer cannot but feel that the publishers merit a mild rebuke for the number of minor spelling and printing errors that mar an otherwise excellent publication.

Otologists and others interested in the subject will want to acquire this volume for their bookshelves. D.V.M.

OSTEOCHONDRITIS DISSECANS

Osteochondritis Dissecans. Loose bodies in joints. etiology, pathology, treatment. By I. S. Smillie, O.B.E., Ch.M., F.R.C.S. (Ed.), F.R.F.P.S. Pp. viii + 224. Illustrations. 60s. + 1s. 11d. postage. Edinburgh: E. & S. Livingstone Ltd. 1960.

The author of this monograph states that the condition of osteochondritis dissecans is not a single entity, but that there are different aetiologies for similar radiological appearances in different age-groups, which he lists. However, his major tenet about the condition is shown in the following passage (p.15): 'Thus osteochondritis dissecans superimposed on an anomaly of ossification is no different than osteochondritis dissecans occurring *de novo* whether it is in the knee or in the head of the second metatarsal. In each instance there is a local vascular deficiency leading to vulnerability to injury and eventually to a form of fatigue fracture; and the same stress which interferes with the blood supply is responsible for the eventual fracture'.

In selected cases he advises operative treatment for the cure of the condition but (p.131) 'judgment, more difficult to acquire than technical skill, is necessary'. On the evidence presented it is difficult to accept unequivocally that the ultimate osteoarthritis of the joint is either delayed or prevented by operative intervention. Radiographic appearances are notoriously deceptive in this condition.

After reading this excellent monograph, one is left to reflect with Goethe who wrote in *Maxims and Reflections*, 'The highest happiness of man as a thinking being is to have probed what is knowable, and quietly to revere what is unknowable'.

The book itself is well produced—a typical Livingstone production. Need one say more? A.S.

BRIEWERUBRIEK : CORRESPONDENCE

ACCIDENTAL ACUTE IRRADIATION FROM COBALT-60

To the Editor: Professor Elliott gave a very full description and discussion of this problem in the issue of the *Journal* for 18 June.¹ As I saw the patient 24 hours before he was admitted to the Johannesburg General Hospital and since there was a considerable change in his condition during this 24-hour interval, I feel that for the sake of completeness his condition, when I saw him at the request of the Secretary of the Radio-active Isotope Committee of the Atomic Energy Board on 4 December, i.e. 3 days after the accident, should be recorded. The following description is taken from my letter to the Secretary on 11 December 1959:

'The patient gave us the history of the accident as far as he was concerned. Apparently, he had arrived on the scene after the smash. He saw something lying in the road which he stated appeared to him to be a condenser from the car. He picked this up and for about 5 minutes, threw it from hand to hand, and then put it into the left-hand pocket of the waterproof coat which he was wearing at the time. He estimated that it was in his pocket for perhaps 10-15 minutes. He was then advised that the capsule contained radio-active cobalt and he put it back on the ground. He stated he was on the scene of the accident for perhaps about an hour and at times walked over the capsule, but most of the time would have been at least 10 ft. away.

'On examining the patient, his general condition appeared to be quite normal. He was not showing any effect of radiation. He complained of no symptoms. There was no suggestion of the intolerable itch which is alleged to have developed later on Friday evening.

'On examining his skin, there was an area over the lateral aspect of his upper left thigh, corresponding to the position where the capsule would have been in his pocket, which appeared reddish. The skin was excoriated, but what was rather striking was that there were sharp outlines representing the size of the cylinder, due apparently to the boundaries of the cylinder having been marked in by scratches. He had another reddish patch, which also had been scratched, over the anterior aspect of his left thigh, and there was a similar patch over the anterior aspect of the right thigh.

'Now, the accident was on Tuesday and this was on Friday and it was rather soon for an erythema as the result of a radiation exposure to develop, particularly from radio-active cobalt. Moreover, there was not the erythematous blush over the involved areas that one would expect to see, but the areas were a dusky red and they had been badly excoriated by scratching.

'As a matter of precaution, I suggested to Dr. Schoeman that he put the patient on ACTH in case he had received an overdose of radiation although there was no suggestion of it at the time.

'On the following morning, Saturday 5 December, I was informed that on Friday evening when the patient had returned from Johannesburg, he had developed an intolerable itching, had collapsed, and had been taken to the Vanderbyl-park Hospital where he was admitted. He was apparently seen by Dr. Craig Cochrane who put him on some form of intravenous therapy containing cortisone.

'I had been informed on Friday that a blood count had already been performed but the result was not available at that time.

'I was also informed on Saturday that the patient was being transferred to the Johannesburg General Hospital and that Dr. Craig Cochrane had diagnosed that the patient was suffering from urticaria and also radiation burns. I was unable to make contact with Dr. Craig Cochrane.

'On Sunday morning I met Professor Elliott at the General Hospital and saw the patient with him.

'At this stage, that is, Sunday, there was a marked change in the appearance of the patient compared with Friday evening. The former erythematous areas on his thighs had been scratched so badly that ulcers had formed and there were more of

these ulcers than there had been erythematous areas on Friday. The patient had scratch marks all over his body and even his face showed evidence of severe scratching.

'I understood from Professor Elliott that apart from some moderate increase in the white cells, no abnormality was detected in the blood count nor was there any abnormality in his urine.

'It was difficult to explain the patient's condition. It was obvious that the amount of radiation he had received from the cobalt capsule (and at that stage we were informed that the cobalt was only 1 curie strength), could not have affected the body to this extent.

'Professor Elliott kindly undertook the complete investigation of the patient. I, therefore, asked Professor Elliott to give such information as he thought would be wise and in the public interest, to members of the press who had been telephoning me for a statement.

'I understand Professor Elliott and his staff have been making enquiries whether the patient could have eaten something which had caused an allergic condition. It had also been reported that two other people who were at the site of the accident had also developed itching but to a lesser extent than the patient.'

Comment

Two points immediately raise doubts regarding the origin of this erythema: Firstly, one does not expect an erythema to appear so soon after the alleged contact with the cobalt, i.e. only 3 days. The second point is that the erythematous area was exactly the size of the cobalt capsule, and its margins were sharply demarcated from the remainder of the skin, as if they had been scratched in by a pin or a knife.

Even if the cobalt had been in contact with the skin, one would not have expected, and could not get, an erythema so sharply demarcated and equal to the size of the cobalt capsule. It will be recalled that only the gamma rays of the cobalt could have had any effect, since the beta rays would have been filtered out by the walls of the capsule.

Moreover, from the description the patient gave, the cobalt could not possibly have remained in the one spot against the skin of the thigh. Even if the coat were strapped down, as Professor Elliott suggests, there would still have been enough movement as the patient walked about for the 10-20 minutes during which the cobalt was in his pocket, to prevent a sharp outline of the erythematous reaction. The erythema, if due to the cobalt, should have been diffuse and not sharply demarcated.

It was extremely unlikely (no matter whether there were 1 or 2 curies in the capsule) that an erythema could have arisen within 3 days and become distributed in the manner which has been described.

There was also a patch on the patient's right thigh, very similar in intensity to the patch or erythema on the left thigh. This was quite inexplicable on the basis of a radiation reaction; I have never seen a sympathetic 'skin reaction' to a radiation reaction on the opposite limb.

I saw the patient in consultation with Professor Elliott on Sunday morning. At this stage his skin was extensively excoriated. He even had extensive excoriations on his face. The erythematous patches on the thighs had now changed shape and colour and showed the effects of vigorous scratching.

The appearances of the skin, therefore, when he was seen on Friday, and the subsequent events on Friday night, Saturday, and Sunday did not fit in with the effects of radiation, either local or general.

Relations with the Press

An interview with 'a radiotherapist' reported in the press was, to my knowledge, not authorized, and it is very doubtful

¹ Elliott, G. A. (1960): S. Afr. Med. J., 34, 524.

ful whether any such interview with a radiotherapist ever took place—certainly not with a radiotherapist who knew the details of the accident. I have not discovered the identity of 'the internationally known nuclear physicist' who was visiting Johannesburg and who gave his opinion to some reporter.

The number of cobalt bombs in use in South Africa and the amount used for industrial purposes, and also the fact that there are no reactors as yet (and there will not be for some years) scarcely warrant the setting up of a special public-relations department on the subject.

The action taken by the Secretary of the Radio-active Isotope Committee of the Atomic Energy Board is, however, entirely in keeping with the line suggested by Professor Elliott. The Secretary of the Isotope Committee, who asked me to see the patient on Friday, informed me that the press were asking for a statement on the subject. When I saw Professor Elliott on Sunday, I suggested that as the patient was under his care, he should issue all statements to the press.

Professor Elliott refers to a photograph of the patient. I understand that unknown to Professor Elliott or any member of his staff until it was too late, a press photographer had come into the ward and, with the consent of the patient, had taken a photograph of him. Whether this was the photograph which was published or not, I do not know.

No public-relations department can prevent photographs from being taken under these conditions, or interviews with 'radiotherapists' or the views of mysterious world-renowned physicists from being published. The action taken by the Secretary of the Isotope Committee on behalf of the Atomic Energy Board was all that could have been done anywhere. The Secretary gave no statement, nor did he permit any physicist or anybody else connected with his department to make any statement to the press without authority.

It is extremely unlikely that another similar unfortunate accident will occur. If it does, a similar course of action would be taken—the physician in charge of the case would be asked to make whatever statement he considered wise and necessary, and it can only be hoped that unauthorized statements would not be published by the press.

Dangers of Radiation

It is not only in Great Britain and other countries abroad that the dangers of radiation have been so exaggerated that patients have refused to undergo essential X-ray examinations. I have known of elderly women in Johannesburg who refuse to have barium meals, and of a physician who wrote a long memorandum to the head of his department on the risk to patients of having one examination of the chest a year as a check on pulmonary tuberculosis. Only yesterday I saw a woman doctor who refused to have an apical view of her lungs taken to confirm the presence of cavitation at the apices, because she had been X-rayed 2 years previously. These fears only come about through exaggerated reports in the press on the extent of the radiation hazard, and ignorance of the subject. On the other hand, there is no doubt that radiation hazards (both somatic and genetic) still exist, even from routine X-ray diagnosis and therapy.

I have recently seen 2 cases of serious radiation injuries within a fortnight, one in a doctor who has for some years done his own screening, and the other in an unfortunate patient who had been treated for eczema with X-rays (not by a radiologist) which resulted in his index finger having to be amputated.

Although one cannot accept the statement that in the patient who was exposed to a radio-active cobalt source the injuries to the skin or his general condition were due to the radiation from the cobalt capsule, the greatest care is nevertheless essential in any work involving ionizing radiation.

M. Weinbren

X-ray Department
Chamber of Mines Hospital
P.O. Box 774
Johannesburg
29 June 1960

GENERAL PRACTICE IN AUSTRALIA FOR SALE

To the Editor: I should like to know whether any of your members would be interested in purchasing my practice in this country town. There is an assured income of approximately £A 6,500 *per annum* and the practice is an unopposed one in a country town of 1,750 population within it and about 1,650 in the surrounding countryside. I do about 40 mid-wifery cases *per annum* and general surgery—herniotomy, appendicectomy, hysterectomy, Caesarean section, tonsillectomy, etc. I have a well-appointed house of 3 bedrooms with attached surgery suite.

I am asking £3,000 for the practice and £5,600 for the house. Terms are available and I might consider a lease. Further and fuller details are available on request.

G. Clayton

P.O. Box No. 19
Wagin, Western Australia
4 July 1960

THE PERSONAL DOCTOR

To the Editor: The College of General Practitioners and all those medical practitioners and educationists who are interested in the future of general practice should read with great care, the long article by T. F. Fox, editor of the *Lancet* on 'The personal doctor'. Dr. Fox has set down in detail his reflections on this subject following a visit to the USA as the guest of the Milbank Memorial Fund. His fresh outlook and original ideas combined with the wisdom of many years' experience have never been better enunciated.

Speaking of Great Britain he says 'with hospital specialists almost everywhere accessible, the general practitioner (composite or otherwise) is dead. But the personal doctor is needed more than ever'.

We have now got used to the idea that the medical curriculum is not designed towards the training of a general practitioner but rather towards the training of 'the basic doctor'. We have for long agreed in this country that graduation in medicine does not constitute 'fitness for practice'. Officially we regard the compulsory intern year as the necessary supplement to medical graduation which will give at least a modicum of 'fitness to practice' and justify registration. We must move on now to the idea that the basic doctor, as certified by a medical degree, can be rendered officially 'fit to practice' by a year's compulsory internship, but that to become a 'personal doctor' he requires 'something else' which will give to him the status of a specialist in his own category.

If Dr. Fox is right, and I believe he is, then we must anticipate that in a short while the 'general' practitioner will be as dead in South Africa as he is in Great Britain. We must therefore start to think how we can make the 'personal doctor' rise like a phoenix from the ashes. In other words we must think what type of training is required to convert a 'basic doctor' who has had a year of compulsory internship and is now registered as a medical practitioner into a 'personal doctor'. (Some people might prefer the term 'family doctor' but that is beside the point.)

Careful perusal of Dr. Fox's article will give many clues to the 'something else' which is required. I suspect that it will not be comparable with the academic training which is laid down in this country for all the other medical specialties. Dr. Fox believes that the most important ingredient is 'vocation'. Our psychologists and psychiatrists will probably prescribe more psychology and psychiatry. Some of this may be necessary but it will not of itself create a vocation nor give the 'personal doctor' all of the 'something else' which Dr. Fox prescribes.

It is up to the College of General Practitioners to suggest its content.

J. F. Brock
Professor of Medicine

Department of Medicine
University of Cape Town
Medical School
Observatory, Cape
1 July 1960

1. Fox, T. F. (1960): *Lancet*, 1, 743 (2 April).